VSB — TECHNICAL UNIVERSITY OF OSTRAVA

FACULTY OF ECONOMICS

DEPARTMENT OF FINANCE

An analysis of the Effect of Asset Liquidity on Capital Structure in a Chosen Economic Sector

Analýza vlivu likvidity aktiv na kapitálovou strukturu veřejně obchodovaných společností

Student: Bc. Kunli Wang

Supervisor of the master thesis: Prof. Ing. Martin Macháček Ph.D.

Ostrava 2019

VŠB - Technical University of Ostrava
Faculty of Economics
Department of Finance

Diploma Thesis Assignment

Student: **Bc. Kunli Wang**

Study Programme: N6202 Economic Policy and Administration

Study Branch: 6202T010 Finance

Title: An Analysis of the Effect of Asset Liquidity on Capital Structure of Public Companies
Analýza vlivu likvidity aktiv na kapitálovou strukturu veřejně obchodovaných společností

The thesis language: English

Description:

1. Introduction
2. Financial Macroeconomics in a Post-Crisis Era
3. Asset Liquidity and Capital Structure: Theory and International Evidence
4. Empirical Analysis of the Effect of Asset Liquidity on Capital Structure
5. Conclusion

Bibliography
List of Abbreviations
Declaration of Utilisation of Results from the Diploma Thesis
List of Annexes
Annexes

References:

KNOOP, Todd A. *Modern Financial Macroeconomics: Panics, Crashes, and Crises*. Malden: Wiley-Blackwell, 2008. ISBN 978-4051-6180-0.
KORAJCZYK, A. Robert and Amnom LEVY. Capital Structure Choice: Macroeconomic Conditions and Financial Constraints. *Journal of Financial Economics*. 2003, No 1, p. 75. ISSN 0304-405X.
SHLEIFER, Andrei and Robert VISHNY. Fire Sales in Finance and Macroeconomics. *Journal of Economic Perspectives*. 2011, No. 1, p. 29. ISSN 0895-3309.

Extent and terms of a thesis are specified in directions for its elaboration that are opened to the public on the web sites of the faculty.

Supervisor: **prof. Ing. Martin Macháček, Ph.D. et Ph.D.**

Date of issue: 23.11.2018

Date of submission: 26.04.2019

Ing. Iveta Ratmanová, Ph.D.
Head of Department

prof. Dr. Ing. Zdeněk Zmeškal
Dean

"I hereby declare that I have elaborated the entire thesis including annexes myself."

Ostrava dated 26.04.2019

Kunli Wang

Student's name and surname

Content

1. Introduction

Capital structure has been one of the most broadly argued subjects in corporate finance.

Since the study of Modigliani and Miller (1958), the question has been raised that how the mixture of debt and equity in capital structure affects the firm value. In addition, the factors that can have impacts on firm's capital structure are very argumentative subject in the finance literature. So far there have been many studies conducted on the determinants of capital structure. Among various factors, asset liquidity is one of the most important external influencing factors, it is also one of the most obvious financial characteristics of the firm.

In 2006, the subprime mortgage crisis which started in the United States and soon turned to the Global Financial Crisis showed that the market's trust crisis triggered the lack of institutional liquidity. In the midst of the crisis, many financial institutions had difficulties in raising funds in the short-term to respond to customers' "swings" and thus collapsed. This reflects the importance of asset liquidity to the market. After the Global Financial Crisis, Chinese firms have attached great importance to the proportion of cash flow in business operations. The research shows that the total monetary assets account for about 22% of the total assets in China's listed firms, the net total fixed assets account for 24.32% of the total assets, and the average asset-liability ratio is about 45%.

From the existing research results, different conclusions about the impact of asset liquidity on capital structure of the firm can be derived. Some researchers support the

positive correlation between the capital structure and asset liquidity, while others conclude that capital structure is negatively correlated with asset liquidity. Based on the above-mentioned background and research status, this thesis selects the data of 30 Chinese listed companies operating in real estate industry in 2013 - 2017 and listed on the Hong Kong Stock Exchange for empirical analysis. The aim of this thesis is to investigate whether there is a significant correlation between the capital structure and asset liquidity, with other firm-level characteristics such as asset tangibility and profitability added to extend the past studies.

The main ideas of this thesis are to find relevant research questions, make reasonable assumptions, research and solve problems, and combine theoretical research with empirical research. In chapter two, we describe the causes, theories and development of recent financial crisis, which help us to understand the importance of asset liquidity overall. In chapter three, we analyze and elaborate existing representative literature and research results. In particular, we describe the past research of the relationship between the capital structure and asset liquidity. Also, we introduce the influencing factors of capital structure. In chapter four, we make empirical tests for our hypotheses, and we select the data from the annual reports of Chinese listed firms operating in real estate industry during the 2013 to 2017 period. Then, we select firms' capital structure, liquidity, asset tangibility, profitability indicators to construct a multiple linear regression model. After that, we perform pooled Ordinary Least Squares (OLS), fixed effects analysis, and random effect analyses on the panel data of the regression model, and we use Hausmann test for both fixed effects and random effects

models to decide which model we should use. In chapter five, we combine with the above-mentioned theoretical and empirical analyses to get our conclusions and the policy recommendations and research outlook.

2. Financial Macroeconomics in a Post-Crisis Era

In this chapter, we mainly focus on the 2006-2007 global financial crisis and the subsequent great recession of 2008-2009. First, we describe the development of macroeconomic and financial markets before the crisis, which contains some of the fuses that have caused the financial crisis. Then we explain the impact of the financial crisis, and the measures taken in the face of the crisis and the subsequent development.

2.1 Pre-Crisis Development

The causes of the 2006-2007 global financial crisis have been analyzed by scholars and many have come to different conclusions as to which cause is at the core of the crisis. Now, we describe the macroeconomic and financial market development in a pre-crisis era.

2.1.1 Macroeconomic and Financial Market Development

The deep institutional reason for the subprime mortgage crisis lies in deregulation The US financial regulators could not control over the size and quantity of subprime loans and various derivatives, and ignored the potential financial risks in the market, which all reflect poor supervision. Deregulation has always been the management method that Alan Greenspan has advocated, and the US central bank lowered the standards of mortgage loans during his time as the chairman of the Federal Reserve System (Fed), which resulted in that more lenders with poor living conditions purchased houses through lower costs loans. The lack of strict supervision by US

regulators on market rating agencies has also led to the subjectivity of rating agencies in rating subprime-related products, and greatly reduced the rating of subprime-related products in a large scale. It has hurt investors' confidence and deepened investor panic, which eventually led to panic on a global scale.

Because of the financial deregulation by government, access to mortgage loans has become extremely easy since mid-1990s. In order to promote economic growth and employment, Fed cut interest rates thirteen times in a row. The federal funds rate fell from 6.5% to a historically low level of 1% from 2001-2003. Too low interest rates have triggered loose credit, which has also directly boom the people's investment by loans. More and more people with unstable living conditions have joined the ranks of buyers through bank loans. That was, because the market's general expectations for the US housing market were too high, finally it stimulated the US housing market. House prices soared by about 85% between 1996 and 2006, which laid the seeds for the outbreak of the subprime mortgage crisis.

For financial derivatives, their development is conducive to the efficiency of funds using, but its pricing and trading depends on accurate market evaluation. When there is a problem with the market rating agency, the crisis of confidence begins. Because global investors trust the three major credit rating agencies[1] in the United States, they can be able to buy subprime-related products with confidence. The same level of US Treasury bonds as triple-a securities rated by these rating agencies become the garbage in the

[1] The three major credit rating agencies – Moody's, Standard & Poor's and Fitch – controlling nearly the entire market.

hands of investors overnight. The unrealistic rating of these rating agencies and the slowdown in the rating movement after the outbreak of the subprime mortgage crisis have also increased the intensity of the subprime mortgage crisis to a certain extent, which has contributed to the negative impact of this crisis.

In addition, real wages have risen as a result of falling prices in the United States or deflation in the European Union. In the case of the US, the real average hourly earnings were decreasing over the pre-crisis period due to an increase in consumer prices. When the recession began, prices fell quickly, and consequently, real hourly earnings have increased. In fact, the crisis has contributed to correcting a deterioration in real hourly wages that was driven by rising inflation and stagnant nominal wages prior to the downturn of 2008-2009.

2.1.2 Main Economic Theory Explanations of the Global Financial Crisis

a) New Keynesian Theory

New Keynesianism refers to the theory that some non-Keynesian ideas and methods are formed on the basis of Keynesianism after the 1970s. The non-market clearing assumption[2] (sticky prices and wages) is the most important assumption of New Keynesian theory, which is derived from the original Keynesianism. The other assumption is that the New Keynesianism believes firms are in imperfectly competitive

[2]The basic implication of non-market clearing is that wages and prices cannot be adjusted quickly to make the market clear after a demand shock or supply shock. Slow wage and price adjustments require a long process for the economy to return to the state of normal production. It is also called sticky prices and wages.

markets rather than perfectly competitive markets, which means firms are price maker. Moreover, New Keynesian theory believes that during the economic recession, the role of monetary policy is limited because of liquidity trap[3], and wage reduction is not effective. Using fiscal policy and increasing government spending should be effective measures to deal with the financial crisis, increase employment and slow down the economic recession. In addition, the increase or decrease in the money supply of the central bank will cause the interest rate to fall or rise. Under the condition that the marginal efficiency of capital is certain, the decline of interest rate will cause the investment to increase, and the rise of the interest rate will cause the investment to decrease. The increase or decrease of investment will cause the same direction of expenditure and income to change through the multiplier effect. For a long time, in order to stimulate economic growth, the US government has been pursuing an expansionary fiscal deficit policy and issuing a large amount of government bonds. Especially after 2000, the US Nasdaq stock market bubble burst and the US was at risk of economic recession. In line with the expansionary fiscal deficit policy, the Fed has also continuously reduced interest rates, resulting in long-term interest rates in the low level. United States. On the other hand, due to the relaxation of banking regulation, allowing banks to engage in speculative business, the return rate of some high-risk

[3] When the interest rate has no ability to decrease in a certain period of time, people will expect the interest rate rise and the bond price to fall in the future. The elasticity of money demand will become infinite, that is, even there are more currency added, people will store them. In the event of a liquidity trap, a loose monetary policy cannot change market interest rates, which makes monetary policy ineffective.

products was as high as 25%. A large amount of loans and debts made credit risk extremely high, so the outbreak of credit crisis in 2007 triggered the financial crisis.

b) New Classical Theory

New Classical theory emphasizes the role of the market in economic development and believes that economic development can achieve balanced development through the “invisible hand” of the market. The main points include: opposition to state intervention and program regulation, the free market dominant model is the most effective; the state's functions are to protect private property rights and regulate the supply of money and other limited economic functions; relax the regulation of capital and financial markets to achieve trade and financial liberalization. Moreover, it assumes there are the rational expectations, which means that the subjective expectation of economic agents on economic variables will be consistent with the true or objective mathematical conditional expectations of these variables. On the contrary to New Keynesian theory, prices and wages are not rigid but flexible.

While under the conditions of the New Classical system, workers and trade unions were in a disadvantaged position. And the lack of assistance and corresponding policy guarantees, it is difficult to guarantee their income and growth. Due to insufficient construction of guaranteed housing, low-income people could only buy houses through mortgage loans, so they became the main debtors of the financial crisis. This group lacked sufficient resources of income, so its debt repayment ability was weak. When rising interest rates made it hard to repay debt on meager wages, credit risk was

concentrated, triggering the financial crisis. On the other hand, since eighty percent of wealth is concentrated in the hands of twenty percent of the people (Pareto 1906), the surplus value of the capitalists in the United States has not entered the production field, but has invested in the field of financial speculation. The overheating of real estate has caused overproduction in the real estate sector, while the consumption in other sectors also had overproduction. Trade liberalization and financial globalization advocated by New Classical theory further aggravate the economic turbulence in the world. Due to the deregulation of financial institutions, funds were arbitrarily flowing in and out. The developed countries led by the United States rely on their trade liberalization and financial globalization to promote a higher degree of socialization of production, so that production materials and financial assets were concentrated in a few countries. The gap between the rich and the poor on a global scale has further increased. Adapting to the requirements of international monopoly capital expansion and economic globalization, emerging markets exported commodities, resources and services to developed countries so that accumulated a large amount of foreign exchange reserves. Therefore, when the US financial crisis broke out, it quickly spread to the whole world.

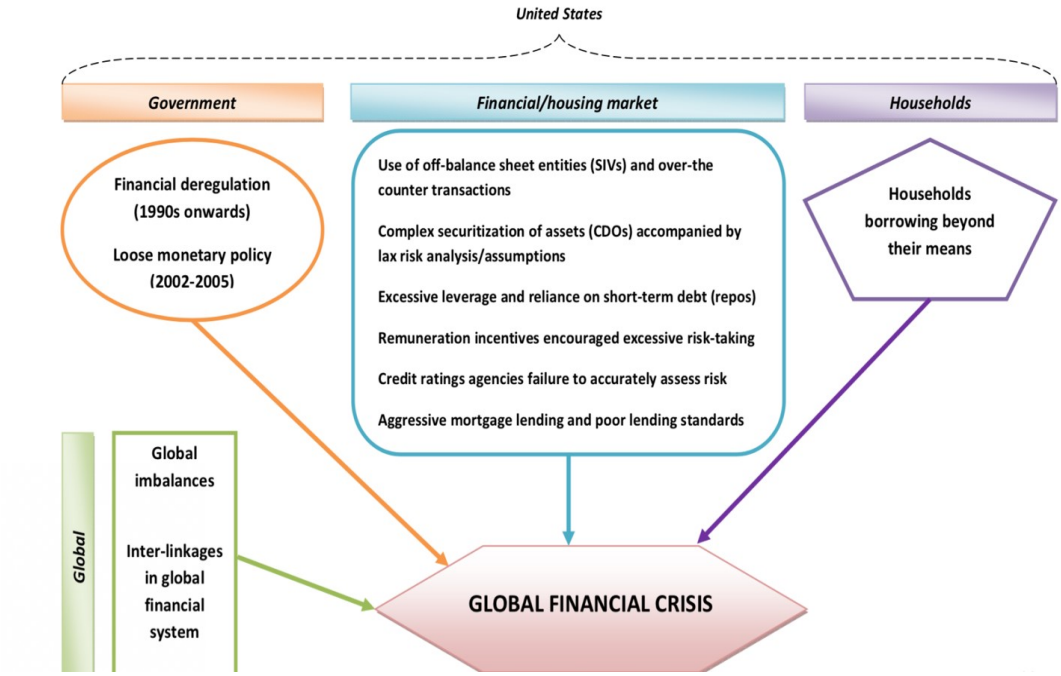
2.2 Global Financial Crisis and Great Recession

The Global Financial Crisis was largely unexpected and due to its complex roots, it continued to puzzle both policymakers and economists as it unravelled and sucked in at first banks and companies, and then economies across the globe.

2.2.1 Factors Behind the Crisis

From the global financial crisis experience, we can get four core and interrelated factors, which are showed in Fig.2.1.

Fig.2.1 Key factors Behind the Global Financial Crisis



Source: http://ftp.iza.org/dp4934.pdf

The financial crisis that started in the United States in mid-2007 eventually spread around the world to both advanced and developing economies resulting in the worst recession since the Second World War. In spite of the severity of the crisis, the way in which countries were affected by the recession in terms of economic contraction and subsequent deterioration in labour markets remained widely divergent.

In fact, diversity is a sign of the Great Recession of 2008-2009. Since the United States went into recession at the end of 2007, most advanced economies have joined

the ranks, particularly those exposed through financial and later trade channels. But, at the same time, others, particularly in the Asia region (namely China and India but also Australia), have avoided a major contraction, despite their integration with the global economy. In fact, in contrast to some of the early predictions, the impact of the crisis on developing countries has been far from universal. The most severely affected were middle-incomes countries, especially in Central and Eastern Europe and the Commonwealth of Independent States. This has been driven by the combination of the credit crunch[4] and domestic imbalances such as large current account deficits and housing bubbles. Overall, the smaller, more open economies have been hit harder, while the larger emerging economies have been supported by domestic demand and government spending. China has especially continued to grow strongly during the crisis.

2.2.2 Effects on the United States

The Great Depression had a major economic and political impact on the United States. Although the recession lasted technically from December 2007 to June 2009, many important economic variables did not return to pre-recession levels until 2011-2016. For example, real GDP fell by $650 billion (4.3%) and it was not until the third quarter of 2011 that it regained its pre-recession level of $15 trillion. Household net worth (reflecting the value of the stock market and house prices) fell by $11.5 trillion

[4] A credit crunch occurs when there is a lack of funds available in the credit market, making it difficult for borrowers to obtain financing. A credit crunch can do a lot of damage to the economy by stifling economic growth through decreased capital liquidity and the reduced ability to borrow. When coupled with a recession, a credit crunch will often lead to many corporate bankruptcies.

(17.3%) until the third quarter of 2012, when the pre-recession level of $66.4 trillion was regained. As of May 2014, the number of employed people decreased by 8.6 million (6.2%) and did not regain the pre-recession level of 183.3 million. The unemployment rate peaked at 10.0% in October 2009 and did not return to 4.7% before the recession until May 2016.

A key driver of slowing economic recovery is that individuals and businesses repay debt for several years instead of borrowing, spending or investing as historically. This shift to private sector surpluses has driven a considerable government deficit. However, the federal government has spent about $3.5 trillion (reduced its percentage of GDP) since the 2009-2014 fiscal year, which is a form of deflation.

2.2.3 Effects on Europe

Since many countries choose to use taxpayer funds to save their banking systems, the European crisis generally develops from a banking system crisis to a sovereign debt crisis. The difference in Greece is that it faces huge public debt rather than problems in the banking system. Some countries have received bailout packages from the troika (European Commission, European Central Bank, International Monetary Fund), which has also implemented a series of emergency measures.

Many European countries began implementing austerity plans between 2010 and 2011, reducing budget deficits relative to GDP. For example, according to the CIA World Profile, Greece increased its budget deficit from 10.4% in 2010 to 9.6% in 2011.

Iceland, Italy, Ireland, Portugal, France and Spain have improved the budget deficits from 2010 to 2011 compared to 2010.

However, with the exception of Germany, the public debt-to-GDP ratio of each of these countries has increased from 2010 to 2011. For unemployment rate, it has increased from 2010 to 2011 in Spain, Greece, Italy, Ireland, Portugal and the United Kingdom (CIA World Profile). There have been no major changes in France, while in Germany and Iceland, the unemployment rate has fallen. Eurostat reported that the unemployment rate in the euro zone reached a record level of 11.6% in September 2012, up from 10.3% last year.

2.2.4 Effects on Other Countries

In the era of the Great Depression, Poland and Slovakia were the only two members of the European Union to avoid a decline in GDP. As of December 2009, the Polish economy has not yet fallen into recession, or even contracted. Although India, Uzbekistan, China and Iran have slowed their economic growth, they have not entered a recession. South Korea barely avoided a technical recession in the first quarter of 2009. The International Energy Agency said that South Korea was only large OECD country to avoid the 2009 recession. Australia experienced a technical decline after only a quarter of negative growth in the fourth quarter of 2008, and GDP grew positively after 2009.

2.3 Macroeconomics after the Crisis

Because of the huge impacts caused by global financial crisis, governments across the globe increasingly recognized the severity of the downturn and the urgency to intervene in order to avoid a catastrophic collapse of the financial markets and real economy. For macroeconomic theory, the Dynamic Stochastic General Equilibrium (DSGE) model has been improved. For regulation, Macro and micro prudential regulation has been established.

2.3.1 Link between Macroeconomy and Financial Market Development

a) Fire Sale

The fire sale can be seen as a forced sale of an asset at a dislocated price. The asset sale is forced in the sense that the seller cannot pay creditors without selling assets. Assets sold in fire sales can trade at prices far below value in best use, causing severe losses to sellers. Fire sales can also lead to fragility of financial markets during crises. When a fire sale leads to a sharp reduction in an asset's price, similar assets held by other market participants decline in value as well, which might bring them also to financial distress and forced asset sales. This self-reinforcing process can lead to downward spirals or cascades in asset prices and net worth of market participants. Because of fire sales, risk becomes systemic. Through this process, asset fire sales and the deterioration of the net worth of firms and financial institutions can severely undermine financial intermediation, leading to reductions of real investment and output.

Economic theory suggests that fire sales can lead to reduced efficiency. Before this incident, banks may over-extend their balance sheets if they make mistakes or fail to take into account the social costs of fire sales. After the incident, fire sales weakened the ability of financial institutions and companies to lend and to borrow by lowering their net worth. The existence of externality provides a reason for policy intervention.

Some policies aim to reduce the likelihood of a fire sale scenario. Similarly, policies such as mandated higher discounts and profits in the derivatives market are designed to stop the deleveraging and fire sales cycle before it starts. During the fire sales period, many major financial institutions (such as banks) were put on hold due to lack of access to funds. In this case, two different ways are proposed to increase bank loans and actual investments: 1) the government can lend to banks against risky collateral; 2) the government can directly purchase assets or provide subsidies for certain asset purchasers.

Diamond and Rajan (2010) support that government injects liquid assets into the banking system, they believe that wrong government purchases may distort asset prices in other directions and even lead to losses. On the other hand, Shleifer and Vishny (2010b) believe that injecting liquidity into the banking system may not increase asset prices or lead to new loans to businesses. Instead, banks may take preventive hoarding liquidity or may purchase assets, but still keep their prices far below the level at which new loans become attractive. Another problem with lending or equity to banks is that the government may ultimately support the institutions that ultimately fail, and may

encourage some desperate intermediaries to gamble on government funds by taking on more risks. Buying securities can address asset price dislocations directly, without providing extra subsidies to weak or irresponsible banks. To avoid overpayment of assets, government purchases may target potentially less toxic asset classes, with better prospects for recovering new loans in the short term and less likely to be lost by the government.

The US government has taken many forms to deal with the financial crisis and especially the fire sales policy. The government rescued some financial institutions, but also lent money against risky collateral and purchased some assets. Prior to the bankruptcy of Lehman Brothers in September 2008, the provision of liquidity to financial institutions was the main strategy; in 2009, the purchase of institutional debt became very important. Fed's Chairman Ben Bernanke (2009) described the Fed's credit easing policy for the winter of 2009, and his reasons seemed to correspond primarily to the fire sales analysis provided here. Shleifer and Vishny (2010b) describe the virtuous cycles and multipliers generated by government safe purchases as market liquidity improves. What emerges most clearly from the fire-sales models is the complementarity between tough preventive policies to reduce the risk of fire sales and soft policies when a fire sale and financial crisis is underway.

The basic prescription for these models is that the government intervenes in the market to stop fire sales quickly, because failure to do so can seriously damage the financial system and the overall economy. Although the choice is a controversial option,

we believe that the government supports market participants to buy dislocated securities and even buy them directly, rather than supporting weak or underperforming financial institutions. However, in the face of actual crises, this type of softness works best when combined with safeguards that minimize the chance that the banking system becomes engulfed in fire sales.

b) Shadow Banking

Shadow Bank, also known as the shadow banking system, refers to loans such as real estate loans being processed into valuable securities and traded to the capital market. The real estate industry has traditionally been financed by the banking system, it belongs to the bank's securitization activities, also known as the Parallel Banking System.

The higher the leverage ratio, the higher the degree to which the asset price deviates from its actual value, and the corresponding risk is greater. People are not unclear about this, but at the stage of rising house prices, the shadow banking system earns a lot of profits and its participation. The huge gains from securitization have stunned, and people ignore the huge risks and blow up the asset bubble. However, from 2007, the real estate market began to deviate from people's expectations, and house prices fell. At this time, the second and third types of lenders immediately fell into trouble, and their usual countermeasures were arrears of payments, and the mortgage delinquency rate began to rise. After the loan delinquency rate of the entire financial system increased, commercial banks had to raise the loan standard and only lend money

to the first class of lenders, which led to a sudden decrease in market liquidity. Due to the leverage effect of these securitized products, the book value of the banking system assets has rapidly declined. Some commercial banks have fallen into the insolvency situation, and shadow banks have also been run on. Because these shadow banks rely mainly on short-term notes in the money market to purchase long-term assets with a large amount of high risk and low liquidity, and in this way to realize the unlimited expansion of credit, which makes it fragile when it faces to runs. Finally, the money markets panicked, thousands of highly leveraged hedge funds ran out of money, and the property bubble burst. Finally, the currency market panicked, thousands of high-leverage hedge funds were redeemed, and the bubble caused by the overheating of the real estate market was shattered.

In the shadow banking system, there is also a role that cannot be ignored, namely rating agencies, which have been criticized in the financial crisis for their irresponsible performance in the rating process. The securities derived from the subprime loans are extremely risky, but they are highly rated and are therefore being pursued by people. In fact, the rating agencies have made rating results that were not in line with the real situation because of conflicts of interest. For some highly leveraged structured financial products, because of the high risk, their issuers are often willing to pay higher rating fees, which creates the problem of "adverse selection"[5]. Now, these high-risk financial products have become the main source of income for rating agencies, which makes it

[5] The adverse selection refers to the phenomenon that the quality of market-traded products declines due to the inferior quality of goods sold by the two sides of the transaction and the deterioration of market prices.

difficult for rating agencies to make independent and fair evaluations. Moreover, the competition between rating agencies is becoming increasingly fierce. Even if some rating agencies give unsatisfied ratings for securities issuers based on fair principles, securities issuers can switch to other rating agencies. Therefore, in order to survive in the competition, these institutions give a less fair result. While in the market, due to information asymmetry, investors have no more sources of information, and can only believe that the results given by rating agencies have formed a "herd effect"[6].

After recognizing the excessive growth of leverage in the financial crisis, it is widely believed that more stringent legal norms should be developed. The reformed regulatory system acts as a systematic prudential regulator, and it must be able to do two important tasks: first, it collects, researches, and publishes systematic information that includes a broader range of financial institutions, such as shadow banking systems; second, it must be able to implement the rules on capital adequacy from a systemic perspective. In this system, the central bank should play a more important role because it is the monetary policy maker and the lender of last resort, and it can intervene when necessary. In any case, if the troubled institutions seek help from the central bank, the central bank must conduct an accurate and impartial investigation of its real situation. The best way to do this is through the network and with other regulatory agencies.

c) Fragile Financial System

[6] The herd effect is a typical phenomenon in the field of behavioral finance, which cannot be explained by mainstream financial theory. In economics, the "herd effect" is often used to describe the follow-up mentality of economic individuals.

Information asymmetry is the root of financial fragility. Under the condition of information asymmetry, financial institutions such as banks have inherent fragility, while moral hazard and adverse selection further aggravate the banking crisis. Information asymmetry mainly includes information asymmetry between borrowers and financial institutions and information asymmetry between depositors and financial institutions. In the former case, improper incentives and moral hazard are important reasons for the plight of financial institutions, while the latter explains the reasons for bank runs, indicating that finance is based on collective confidence.

Macroeconomic instability is the main reason for the fragility of financial markets. Many economists believe that macroeconomic instability leads to excessive fluctuations in financial asset prices, especially stock market prices. The excessive volatility of financial asset prices and their linkage effects are often the important sources of financial market fragility. When risks accumulate under certain conditions, they form a crisis. The important reason for the fluctuation of asset prices is excessive speculation caused by irrational market collective behavior.

The modern banking system determines the bank's risky impulses. On the one hand, the banking industry is a highly indebted operating industry. On the other hand, many banking crises make people realize that the government will surely help the banks, which makes the depositors gradually lose the enthusiasm to supervise the banks. Therefore, the inherent financial fragility caused by the main defects of modern banking system is the source of the subprime crisis.

Asset securitization has increasingly integrated credit markets and capital markets. Although the risks of the banking sector can be dispersed into the capital market through securitization, the information asymmetry is intensified due to the extension of bank financing, and the financial fragility represented by moral hazard has also increased. As far as the mortgage securitization chain is concerned, there are six main links. In each link, the purpose of each stakeholder is different. The government hopes that the housing ownership rate will increase and the financial system will remain stable. The borrower hopes that the interest rate cost will decrease. The lender hopes to spread the risk through securitization and obtain more service fees. Government Sponsored Enterprises (GSE) [7]buy packaged loans to generate more collateral and service income. The investors want to invest safely and achieve certain benefits.

Moral hazard exists in the interest competition in information asymmetry. First, the bank sells the mortgage after the loan. The risk of default is not important, which makes it pay less attention to the quality of the loan. When more loans are issued, the bank can get more service fee income, and the bank will do further reverse selection: sell high-risk mortgage loans to pass on risks, and retain high-quality assets. Second, housing GSE can use the government potential credit support and various preferential conditions to obtain high profits in the process of mortgage securitization. The above-mentioned securitization chain motivated by income has repeatedly relaxed the loan

[7] A government-sponsored enterprise is a quasi-governmental entity established to enhance the flow of credit to specific sectors of the American economy. Created by acts of Congress, these agencies, though privately held, provide public financial services. GSEs help to facilitate borrowing for all sorts of individuals, from students to farmers to homeowners.

credit standard. The institutions in all aspects of securitization have lost the supervision and incentive effect on the quality of long-term loans, the quality of mortgage loans has declined, financial fragility has increased. It can be seen that under the specific information structure, the financial market forms financial fragility through the automatic rational choice and behavior change of economic agents. Once a link breaks (price declines), the hidden risks are bound to surface, causing a subprime crisis Therefore, the challenge is to develop a regulatory system that will prevent the similar risk-taking behaviour witnessed in the lead up to the sub-prime crisis.

2.3.2 Improvement of a Core Macroeconomic Model

As a key macroeconomic model, the Dynamic Stochastic General Equilibrium (DSGE) model has developed rapidly in the last three decades and has become one of the important analytical tools for central banks and institutions such as the Fed and the International Monetary Fund (IMF) to make economic forecasts.

To put it simply, the DSGE model studies the general equilibrium problem of the economy under risk, and explores how actual shocks (such as technology shocks or interest rate shocks) are transmitted and trigger economic fluctuations. It describes the dynamic change of variables such as GDP, consumption, investment, price, wage, employment and interest rate. Because it is focused on an uncertain situation, the dynamic optimization method is used to describe the decision-making behavior of each economic entity, and the conditional equations such as resource constraints, technical constraints, information constraints, and market clearing conditions are used to

construct the overall economy. The equations to be satisfied are solved, and the equations are solved to obtain the economic growth expectation under the general framework.

As the global economy gradually emerged from the recession and recovered in an orderly manner, many scholars began to reflect on the weaknesses of the DSGE model and made targeted improvements of it. For instance, the medium-sized DSGE model developed by the Federal Reserve Bank of New York has been extensively studied, and scholars have introduced new variables and constraints based on this model. The basic structure of its four departments became as follows:

Enterprises: manufacturers and financing institutions were included, with manufacturers affected by changes in productivity, while financing institutions affected by changes in investment demand; Family: Providing labor, consuming products, and providing deposits to banks. Affected by changes in labor supply and consumer price increases; Government: Taxing households and businesses and issuing bonds, facing currency and fiscal policy shocks; Bank: Providing loans to enterprises, generating credit friction and being affected by changes in interest rate spread.

The traditional financial accelerator framework reflects the impact of financial friction through the loan relationship between the family and the enterprise. Due to the information asymmetry and agency problems in the credit market, the external financing cost is higher than the internal financing, and the net asset value of the enterprise will change when it encounters an external shock. Then it affects its internal

financing capacity, and the shift to external financing will face rising financing costs, so the external financing of the supply side in credit market magnifies the initial external impact of the manufacturer. After the financial crisis, scholars refined the analysis of financial shocks. For instance, Christiano et al (2010) studied the impact of several financial factors: agency problems in financial contracts, liquidity constraints of banks themselves, and changes in market risk expectations. Walqueetal (2010) established a DSGE model that included the interbank market as the risk premium caused by the bank's financial debt default also creates a financial accelerator.

Gertler and Kiyotaki (2010) further developed the DSGE model that introduced the financial accelerator mechanism to reflect the impact of the financial crisis. In the previous model, only entity manufacturers had credit constraints, and the banking system itself had no financing constraints. The newly developed model introduced the bank as an intermediary between savers and manufacturers, and the bank had an endogenous credit constraint mechanism, which can reflect how credit friction amplifies the impact of exogenous shocks on the real economy. The model simulated how endogenous credit constraints affected lending behavior when bank capital decreased. The model also simulated the liquidity impact banks faced when banks were unwilling to lend each other. However, the central bank can resolve this shock. Unlike commercial banks, the central bank does not have an endogenous credit constraint mechanism. It can intervene in the credit market through unconventional monetary policies to reduce financial market friction caused by credit constraints and weaken the impact on the real economy.

The US agencies such as the New York Federal Reserve has mainly studied the DSGE model to serve the formulation of monetary policy, the core of which is the interest rate policy. In addition to introducing credit spreads, Curdia and Ferrero (2012) also conducted a comparative analysis of the effective real interest rate or the nominal equilibrium interest rate to construct a DSGE model. It was found that the selection of effective real interest rates in a perfectly competitive economy can greatly improve the accuracy of the DSGE model.

All in all, these DSGE models have been significantly improved in their structure from the pre-crisis era, and the accuracy of prediction has increased significantly.

2.3.3 Macro- and Micro Prudential Policies after the Crisis

In this new, post-crisis era of regulatory systems, some of the anachronistic things before the crisis will be abandoned, securitization will be subject to more stringent regulation. The negative impact of excessive leverage and maturity mismatch on financial stability will also receive greater attention. The financial system serves the real economy, and it cannot operate independently from the real economy. Therefore, the establishment of various financial institutions will be based on a more "practical" perspective to support the development of the real economy.

In response to the financial crisis, financial sector regulation has been intensified and expanded in scope. Macroprudential regulation has been established as a new policy field complementing microprudential regulation and other macroeconomic policies, notably monetary policy. A key lesson of the Global Financial Crisis has been

that proper microprudential supervision of financial institutions and their risks is a necessary, but not a sufficient condition to ensure financial stability. Conceptually, microprudential regulation and supervision treats the (macroeconomic) risks faced by financial institutions as being exogenous. By construction, general equilibrium effects and macroeconomic implications are not taken into account. In this respect, macroprudential regulation and supervision complement microprudential regulation and supervision by adding a system- wide perspective. Linkages across the financial system and linkages to the real economy are explicitly taken into account.

Both microprudential and macroprudential authorities use prudential policy instruments and tools that are applied at the level of the individual firm. But they can do so with different objectives. Microprudential policy adjusts capital based on individual institutions' risks, while macroprudential policy adjusts overall levels of capital based on the financial cycle and systemic relevance to guard against systemic risk buildup. Macroprudential policy can also involve regulation of markets more generally (which can thus raise issues of coordination with market regulators) and extend to entities in the shadow banking sector. In addition, systemic risk can evolve in reaction to financial innovation or regulations. Therefore, the perimeter of macroprudential policy and its active instruments may need to adjust over time.

The macro-prudential supervisory architecture of the EU was established right after the financial crisis and the European Systemic Risk Board (ESRB) has been in place as an integrated financial supervisor for macro-prudential supervision since 2011.

The ESRB's aim is to identify systemic risks in the financial system and to propose measures to eliminate them, employing warnings and recommendations, which are subject to a "comply or explain" mechanism. ESRB can play a crucial role in improving efficiency and effectiveness of macroprudential policy making: First, the ESRB has a comparative advantage in analyzing and addressing macro-prudential issues that involve the cross-border and cross-sectoral dimension. Therefore, one might strengthen the ESRB's capabilities to focus on these issues. To this end, cooperation with the European Supervisory Authorities (ESAs)[8] should be intensified in order to enhance its cross-sectorial analytical capacities. Second, the ESRB needs access to relevant data and information, and data sharing among members has to be facilitated. Third, and most importantly, the ESRB provides a valuable platform for the exchange of experiences in macro-prudential policy making. In order to enhance this role, the ESRB could act as a hub for the ex-post evaluation of macro-prudential policies by coordinating and facilitating analytical work.

3. Asset Liquidity and Capital Structure: Theory and International Evidence

For the market, liquidity is the essence of the market, and the financial crisis is essentially a crisis of lack of liquidity. At present, the academic research on liquidity

[8] The European System of Financial Supervision (ESFS) was created as response to the financial crisis and became operational in 2011. This new institutional architecture, consisting of the three European Supervisory Authorities (ESAs) - the European Banking Authority (EBA), the European Securities and Markets Authority (ESMA) and the European Insurance and Occupational Pensions Authority (EIOPA)

mainly focuses on solvency, transaction cost and risk management. The factors influencing the capital structure are complex and systematic. From a macro perspective, the size of the financing market, the financing environment, and the national laws all have complex effects on the capital structure of listed companies. From a micro perspective, corporate management behavior, internal supervision and auditing systems, and protection of investor rights and interests also have significant impact on the capital structure.

3.1 Research on Asset Liquidity

John Maynard Keynes first proposed and developed the definition of asset liquidity in “A Treatise on Money” (1930) and then in “The General Theory of Employment, Interest, and Money" (1936, see Keynes, 2006). It is also the most classic definition of liquidity now, that is, the liquidity refers to the ability of assets can be converted into cash with small losses. The three main purposes of a company holding liquid assets are trading, prevention and speculation. In other words, the purpose of the existence of liquid assets in the enterprise is to meet the unexpected cash needs of the daily operation of the enterprise. Liquid assets are also used to pay debts, reduce bankruptcy costs and obtain income through investment. At the same time, enterprises also need to bear the cost of holding liquid assets when considering liquidity. The main cost structure is the cost of raising capital in the market and the opportunity cost of holding cash assets. The stronger the liquidity of a company, the faster the company's cash circulation and the stronger its short-term solvency.

Hawawini and Viallet (1983) believed that liquidity is represented by the ratio of the equity assets and debt assets to operating assets of enterprises, but fixed assets are excluded. This indicator measures the turnover rate of corporate cash, the higher the ratio, the stronger the liquidity of the company and the stronger the short-term solvency. Van horne (1983) defines liquidity as cash and other assets that converted into cash easily. Liquidity is divided into generalized liquidity and narrow liquidity. Narrow liquidity does not consider the possible discount and only considers speed of converting into cash, it also can be defined that maintain a stable valuation of asset prices to see if they can trade smoothly.

Tobin (1968) believes that the transaction costs generated by realizing assets reflect the liquidity of assets. Liquidity relies on the improvement of market mechanism. The essence of liquidity is the capital and time cost of asset trading. Therefore, liquidity consists of two layers. The first is the cost of capital generated by the transaction, and the second is the time-consuming cost to wait until the expected transaction price occurs.

Mitchems (1990) research indicates that corporate financial risk can be measured more accurately by measuring corporate liquidity. The enterprise's current liabilities and the cash flow required for business operations are used as indicators. If the indicator is larger, the company's external financing is more liquid.

Sartoris Hill (1994) argues that asset liquidity and corporate liquidity should be measured separately. Asset liquidity should follow Keynes's definition and theory,

while corporate liquidity should be rather measured by whether the company can pay off debts and whether it can pay interest on schedule.

Ohara (2000) believes that when a company faces the risk of bankruptcy liquidation, the amount of income that can be obtained immediately from the sale of existing assets is both the liquidity of the enterprise.

Hoirole (2002) examines the needs and management characteristics of liquidity from different stages of business development. The study claims that in the initial and rising period of the enterprise, companies need to maintain a high level of liquidity to hedge against potential liquidity risks.

3.2 Research on Capital Structure

Before the mid-19th century, it was generally believed that the greater the proportion of bonds a company has, the higher the financial leverage and the better performance of the company. It is a signal to release profits, and the valuation of the company is correspondingly higher. However, in 1958, Modigliani–Miller theorem proved that the capital structure has nothing to do with the valuation of the firm.

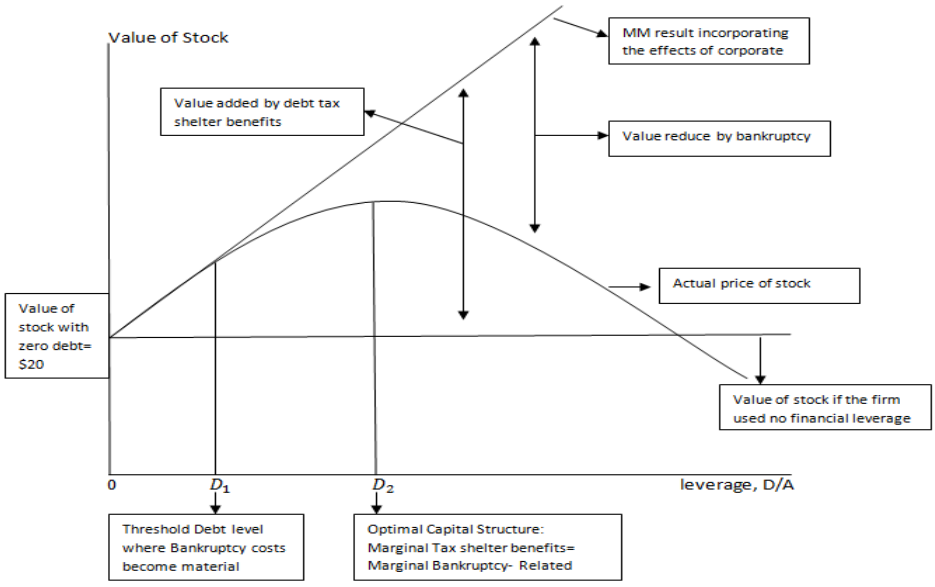
Modigliani–Miller theorem is the authoritative theory of the formation of corporate capital structure proposed by Modigliani and Miller (1958). The theory holds that, based on the fact that the company's financing costs remain unchanged, if the market is a perfect capital market, the company pursues profit maximization without considering the influence of various principal-agent relationships on the target behavior, then the company's existing debt. The value of the value and the value of the equity and

the present value of the future finance should be a constant. No matter what financing method the company chooses, how the proportion of various financing methods changes, how the debt value and the equity value change, the company value is irrelevant to the capital structure.

Fama (1978) studied the premise of the MM theorem and established a static trade-off theory. According to the theory, the limitation of MM theorem is to assume that the financial market is a perfect market. This kind of financial market is completely competitive and frictionless. This market is ideal and cannot exist in reality. Therefore, the theory relaxes the constraints of the MM theorem, and it is most beneficial to develop the capital structure from the microscopic perspective and corporate behavior. The theory holds that debt has advantages and disadvantages for enterprises. This kind of profit is mainly reflected in the fact that the interest on debt can be deducted before tax, so the debt is equivalent to a certain net tax revenue; and the disadvantage of debt is reflected in the enterprise. Excessive debt required will increase the operating costs of the business and cause potential financial risks to the business. Therefore, maintaining an appropriate proportion of debt is the result of weighing the pros and cons for the business. There are different views on the trade-offs between pros and cons, and Modigliani and Miller (1963) expressed optimism about net tax revenues, arguing that such gains clearly make the actual cost of corporate debt financing lower, and explain that management in the general enterprise chooses more debt financing. Alternatives to equity financing; and Mill (1977) argues that debt financing does not actually have a theoretical net tax benefit advantage, because as corporate benefits rise,

the collection of personal income tax will replace corporate tax evasion, so This kind of income is almost non-existent. DeAngelo and Masulis (1980) proposed a net tax benefit in the above two views, but the existence of non-debt tax shields, such as corporate depreciation, innovative investment, etc., may have a tax-saving effect.

Fig.3.1 The Trade-Off Theory of Leverage

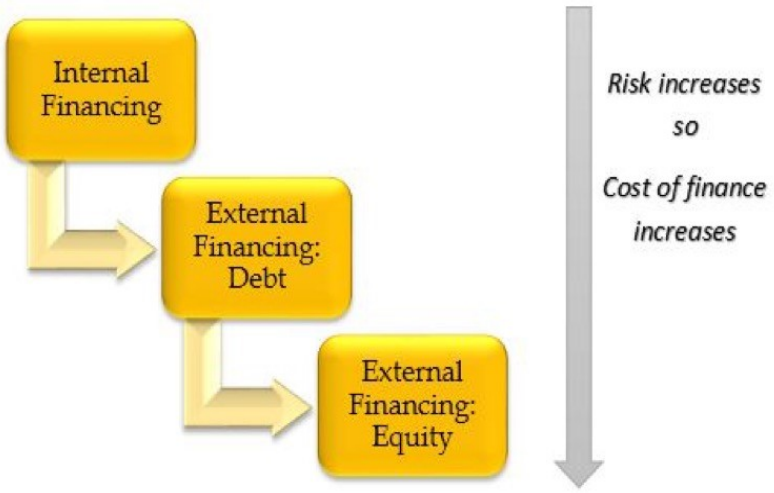


Source: http://actuarialsciencestudies.blogspot.com/2012/03/trade-off-theory.html

Myers (1984) proposed that due to the information asymmetry of the activities of enterprises in the market, the conditions emphasized by the static trade-off theory are still not realistic enough. Therefore, Myers studies from the perspective of information economics and proposes a Pecking order based on information constraints. Enterprises have an information advantage when issuing stocks. At this time, potential investors have asymmetric information about the company. Therefore, the financing behavior of the company conveys the information of the business risk of the investors. Therefore, the equity financing usually has a discounted price. Given this situation, companies will

give priority to bond financing rather than equity financing. According to Myers (1984), companies use the lowest cost of internal funds when financing, followed by debt financing. Equity financing usually considers the use because of its high risk, so the capital structure of the company usually follows the “internal surplus”. The financing level of a debt, a convertible bond, and a stock.

Fig.3.2 Pecking Order Theory



Source: https://efinancemanagement.com/financial-leverage/pecking-order-theory

Berger MJdell (1988) argues that the capital structure of an enterprise is related to the growth and growth stages of the firm and proposes a theory of financial growth cycle. Enterprises with different industry maturities and different growth potentials of the enterprise, different financing methods will be used according to the development time, scale and information changes of the enterprise itself, and various financing channels under different circumstances The proportion will also change accordingly, which will affect the capital structure of the company.

Mayer (1990) conducted an in-depth study of the capital structure. The research shows that in the developed countries with perfect market systems and mature financing markets such as stocks and bonds, the capital structure of listed companies presents a greater similarity. Booth et al. (2001) conducted relevant research in developing countries for this conclusion. The research shows that the capital structure of developing countries is quite different, and the debt levels of listed companies in different developing countries are significantly different.

Based on the theory of modern information economics, Dowd (1996) proposed that due to the asymmetry of information, enterprises have reverse selection, moral hazard and high-cost status verification in the three stages before and after financing. When designing financing products, corporate finance should consider the cost of balancing information asymmetry and enable the information principal to obtain appropriate savings and incentives. In general, information asymmetry in financing is unfavorable for enterprises, and information asymmetry before and after financing is unfavorable to investors. Therefore, because of the existence of moral hazard, companies may prefer to conduct equity financing, while reverse selection and high-cost status verification make companies prefer internal financing.

In addition, management's own management characteristics and domestic legal characteristics are also important determinants of the company's capital structure. Research by Harris and Raviv (1988) proves that the management of the company may choose the financing methods and financing channels that are more favorable to them

in order to protect their own interests, and never evade the risks that enterprises may face. This kind of management behavior will affect the capital structure of the company. For example, Berger et al. (1997) found that in a company with a well-established internal audit system, management may prefer to choose a debt approach for financing because of risk aversion, resulting in an increase in the company's financial leverage.

Pagano et al. (1998) found that in companies that have suffered more legal interference in stock issuance, companies will choose to reduce financing in the stock market. Garvey and Hanka (1999) studied the capital structure adjustment of listed companies in the United States after the promulgation of the second generation anti-acquisition law. The study found that companies that were protected by the law chose to significantly reduce the proportion of external financing to reduce liabilities, proving the law on capital structure. Impact. With the deepening of the research, the academic community further confirmed that the strictness of the legal restrictions on financing will have an impact on the choice of financing methods, which will have a significant impact on the capital structure. Wald and Long (2007) compares the strictness of restrictions on financing and dividend payments with the laws of registered companies in the US state laws, and finds that the stricter restrictions on external financing are relatively low, and the lower the company's liabilities, the legal and policy environment of the country includes the efficiency of law enforcement. And the impartiality of corporate legal characteristics, namely macroscopic factors and institutional factors, not only affects the management's financing decisions but also the ability of enterprises to finance from the outside.

Lemmon and Lins (2003) believes that when investor rights are better protected, the valuation of company assets will increase relatively, and the company can also use internal financing and equity capital to reduce liabilities, thus affecting the company's capital structure.

3.3 Research on the Correlation between Capital Structure and Asset Liquidity

Keynes (1930) believes that low-liquid assets tend to cause the value of corporate bonds to be perceived by investors as high risk and underestimate their value. At this time, corporate managers will choose to reduce low-liquidity assets and pass on positive signals to investors.

The Pecking order theory proposed by Myers and Majluf (1984) is a widely accepted theory in the theory of negative correlation between capital structure and asset liquidity. The theory of superior order financing believes that high liquid assets can be understood as a hedge of debt. Highly liquid assets also mean higher corporate debt. When managers with high liquidity assets tend to invest in liquid assets in projects with positive net present value, they maintain high liquidity and are used to repay in time. Period debt, therefore, high liquidity means a lower asset-liability ratio.

Williamson (1988) believes that from the perspective of financing cost, because of the collateral function, assets with higher liquidity can effectively reduce the cost of asset management and clearing costs, it has higher security for corporate creditors. In

financing, it is usually characterized by easier financing and higher financial leverage, so high liquidity will increase the company's asset-liability ratio.

From the perspective of investor rights, Hairis and Raviv (1990) pointed out that investors will judge the profit of the enterprise according to the situation of the company paying interest, so as to make a cost analysis based on the signal to the business situation of the enterprise, and analyze the enterprise payment under each debt level. The ability of interest, through multiple iterations to weigh the cost of default, through the intervention of business management policies to select the most appropriate level of debt and financial leverage, thereby affecting the company's capital structure. The higher the liquidity of assets, the lower the investor's expectation of default cost, the negative correlation between asset liquidity and bankruptcy liquidation cost, and a positive correlation with financial leverage.

Shleifer and Vishny (1992) argues that corporate managers often intend to control financial leverage to avoid bankruptcy or to maintain a lower bankruptcy liquidation cost. In the case of high liquidity of corporate assets, it is easier for enterprises to raise funds and meet the cash flow requirements of business operations. Therefore, asset liquidity and capital structure are positively correlated.

Bergen and Yermack (1997) studied asset liquidity and capital structure formation from the perspective of information economics. Research shows that the company's management may control the level of debt below the optimal structure for a sound

management style. Therefore, management may choose a conservative liquidity level and debt level in anticipation of high liquidity that will result in high debt.

Myers and Rajan (1998) believes that corporate liquidity is closely related to management's management guidelines. Assuming that the management of the company has high management standards and ethics, consistent with the corporate management objectives, there is no misappropriation of transferred enterprise assets, and the debt-to-equity ratio is positively correlated with asset liquidity. Anyway, if the management of the company has transferred the company's assets, has moral hazard to the management of the enterprise, and exploits the information asymmetry of the investor to embezzle the company's assets, the asset-liability ratio will be related to the asset liquidity curve. The existence of initial liquidity of assets is initially positively related to liabilities, but as the liquidity of assets increases, the debt ratio will decrease again at a certain point in time.

Dc Angelo and Wruck (2001) proposed that high liquidity assets are not a hedge of simple corporate liabilities. Instead, they believe that management can repay debts in financial crisis through high liquidity assets, and manage the company independently by winning time to avoid creditors. Excessive intervention. High liquidity corporate assets represent a higher ability to repay debts in the long-term or future. Management will consider the risk of bankruptcy in the management by guaranteeing a certain percentage of high liquidity assets. In this case, the creditor will shorten the debt contract period by requiring the enterprise to repay the interest, or to abandon part of

the interest, or to increase the security of the asset by adding mandatory debt clauses in the contract. Therefore, asset liquidity will affect the capital structure, and this capital structure should be positively related to asset liquidity.

Litov (2005) concludes with Berner, Ofek and Yermack (1997) through empirical research that the stable management is based on a conservative investment strategy and considers corporate bankruptcy costs and tax shield returns, preferring to choose capital structure with high debt levels. When the capital structure is stable, the cost of structural adjustment will affect structural changes and reduce the impact of liquidity levels on capital structure.

3.4 Firm-level Characteristics

Past researches (Vasiliou and Daskalakis(2009), Ramlall(2009) and Oztekin(2009)) on determinants of capital structure used some characteristics such as: profitability, tangibility, liquidity, non-debt tax shield, size, volatility, product uniqueness, income variability and industry, ownership structure. In this thesis, we use the most common and affecting determinants: liquidity, profitability and tangibility are suggested as independent variables.

3.4.1 Liquidity

Ozkan(2001) indicated that liquidity has ambiguous effect on the capital structure decisions. For liquidity, it should be the ratio of current assets to current liabilities. It is used to measure the ability of a company's current assets to be converted into cash for

repayment of liabilities before the short-term debt expires. Generally, the higher the ratio, the stronger the liquidity of corporate assets and the stronger the short-term solvency. It is generally considered that the current ratio should be above 2:1. If the current ratio is 2:1, it indicates that the current assets are twice the current liabilities. Even if half of the current assets cannot be converted into cash in the short term, all the current liabilities can be guaranteed to be repaid.

It should be noted that companies with high current ratios do not necessarily have the ability to repay short-term debts. Because cash, securities, and accounts receivable have strong liquidity, but inventory, deferred expenses have a longer period to be converted into cash, especially in the case of inventory.

$$Liquidity = \frac{Current\ Assets}{Current\ Liabilities} \tag{3.1}$$

Hypothesis 1A:

H0: There is a negative relationship between liquidity and leverage;

H1: There is a positive relationship between liquidity and leverage.

Hypothesis 1B:

H0: There is a negative relationship between liquidity and short-term leverage;

H1: There is a positive relationship between liquidity and short-term leverage.

Hypothesis 1C:

H0: There is a negative relationship between liquidity and long-term leverage;

H1: There is a positive relationship between liquidity and long-term leverage.

3.4.2 Profitability

Past studies done by Ozkan(2001), Gaud et al.(2003), Bevan and Danbolt(2002) show a strong inverse relationship between debt ratio and profitability. The ratio of earnings before interest and tax to total assets is assumed as measure to profitability.

The ratio is considered to be an indicator of how effectively a company is using its assets to generate earnings. Earnings before Interest and Tax (EBIT) is used instead of net profit to keep the metric focused on operating earnings without the influence of tax or financing differences when compared to similar companies.

The value of an asset may decrease or increase over time. In the case of real estate, asset values may rise. Since this profitability formula uses the book value of assets on the balance sheet, it may substantially underestimate the real market value of fixed assets. This leads to a higher ratio where the return on total assets is higher than it should be because the denominator is too low.

$$Profitability = \frac{EBIT}{Total\ Assets} \tag{3.2}$$

Hypothesis 2A:

H0: There is a negative relationship between profitability and leverage;

H1: There is a positive relationship between profitability and leverage.

Hypothesis 2B:

H0: There is a negative relationship between profitability and short-term leverage;

H1: There is a positive relationship between profitability and short-term leverage.

Hypothesis 2C:

H0: There is a negative relationship between profitability and long-term leverage;

H1: There is a positive relationship between profitability and long-term leverage.

3.4.3 Asset Tangibility

According to research of Jensen and Meckling(1976), it concluded that asset tangibility has positive correlation with debt ratio. What's more, Bennett and Donnelly (2003), Rajan and Zingales(1995) and Gaud et al.(2003) supported this correlation based on their evidences. However, Bevan and Danbolt(2000) and Psillaki and Daskalakis(2008) said that there is a negative relationship between asset tangibility and leverage. We use long-term and short-term leverage for testing this relationship.

$$Asset\ Tangibility = \frac{Fixed\ Assets}{Total\ Assets} \tag{3.3}$$

Hypothesis 3A:

H0: There is a positive relationship between asset tangibility and leverage;

H1: There is a negative relationship between asset tangibility and leverage.

Hypothesis 3B:

H0: There is a positive relationship between asset tangibility and short-term leverage;

H1: There is a negative relationship between asset tangibility and short-term leverage.

Hypothesis 3C:

H0: There is a positive relationship between asset tangibility and long-term leverage;

H1: There is a negative relationship between asset tangibility and long-term leverage.

4. Empirical Analysis of the Impact of Asset Liquidity on Capital Structure

In this chapter, we will establish the econometric model of this study based on the theory of the previous chapters, then we will verify the theoretical part through the panel data processing method, and finally get our conclusion.

4.1 Econometric Model

In this section, we will process our four econometric models and introduce methods that we deal with panel data: fixed effect model and random effect model.

4.1.1 Research Assumptions and Model Settings

So far, the research on the company's capital structure and asset liquidity has been extensive, but there are few empirical studies starting from the micro perspective. Keynes (1930) first proposed a study on capital structure and asset liquidity. He pointed out that because of the information asymmetry in the market or the excessive financing cost of the company, it is possible that the company's issued bonds values are low, so the company managers often choose to hold a large number of highly liquid assets. Majluf and Myers (1984) also analyzed the relationship between capital structure and asset liquidity at the company level through Pecking order theory. They believe that high liquidity assets and cash can be regarded as negative debts. When the business is in a bad state and there is not enough investment in some projects with a positive net present value, the manager will not choose to repay the debts due and lose liquidity,

which means that the asset to liability ratio is higher. This shows that the company's capital structure is closely related to asset liquidity.

Therefore, based on the above analysis, this paper constructs the following multiple linear regression model.

$$\frac{\text{Debt}}{\text{Equity}_{it}} = \alpha_0 + \beta_1 \text{ Liquidity} + \beta_2 \text{Profitability} + \beta_3 \text{ Asset tangibility} + \varepsilon_{it} \quad \text{Model (1)}$$

$$\frac{\text{Debt}}{\text{Asset}_{it}} = \alpha_0 + \beta_1 \text{ Liquidity} + \beta_2 \text{Profitability} + \beta_3 \text{ Asset tangibility} + \varepsilon_{it} \quad \text{Model (2)}$$

$$\frac{\text{ST-Debt}}{\text{Asset}_{it}} = \alpha_0 + \beta_1 \text{ Liquidity} + \beta_2 \text{Profitability} + \beta_3 \text{ Asset tangibility} + \varepsilon_{it} \quad \text{Model (3)}$$

$$\frac{\text{LT-Debt}}{\text{Asset}_{it}} = \alpha_0 + \beta_1 \text{ Liquidity} + \beta_2 \text{Profitability} + \beta_3 \text{ Asset tangibility} + \varepsilon_{it} \quad \text{Model (4)}$$

Among them, α_0 is the intercept term, β_1, β_2, β_3 are the regression coefficient of the corresponding variable, ε_{it} is the random disturbance term, and the specific meaning of the dependent variable and the independent variable will be explained below.

4.1.2 Econometric Methods

Generally, panel data model can be described as:

$$Y_{it} = \alpha_i + X_{it}\beta + u_{it} \quad (4.1)$$

For particular individual i, α_i represents those factors that do not change over time, and in most cases these factors are not directly observable or difficult to quantify, such as individual consumption habits, regional economic structure, legal and property rights systems, we generally call them as "individual effects". In practice it is assumed that individual regression equations have the same slope, but different intercept terms can be used to capture heterogeneity, while the unobservable random variable α_i represents the individual heterogeneity.

Pooled OLS

If all individuals have exactly the same regression equation, the model can be written as:

$$Y_{it} = \alpha + X_{it}\beta + u_{it} \tag{4.2}$$

We can put all the data together, like doing cross-section data OLS regression, so called " Pooled OLS regression ".

Fixed Effects

When we are only interested in analyzing the impact of variables that vary over time, we can use fixed effects (FE).

Given the individual i, average the time on both sides of the equation (4.1), we can get new equation:

$$\overline{Y}_i = \alpha_i + \overline{X}_i\beta + \bar{u}_i \tag{4.3}$$

The original equation is subtracted from the average equation to obtain the dispersion form of the original model:

$$Y_{it} - \overline{Y}_i = (X_{it} - \overline{X}_i)\beta + (u_{it} - \bar{u}_i) \quad (4.4)$$

Therefore, fixed effects removes the effect of those time-invariant characteristics, we can assess the net effect of the predictors on the outcome variable.

Another important assumption of the FE model is that those time-invariant characteristics are unique to the individual and should not be correlated with other individual characteristics. Each entity is different therefore the entity's error term and the constant (which captures individual characteristics) should not be correlated with the others.

Another way to see the fixed effects model is by using binary variables. So the equation for the fixed effects model becomes:

$$Y_{it} = \beta_0 + \beta_1 X_{1t} + \cdots \beta_k X_{kt} + \gamma_2 E_2 + \cdots + \gamma_n E_n + u_{it} \quad (4.5)$$

En is the entity n. Since they are binary (dummies) we have n-1 entities included in the model. Fixed effects model is also called the least square dummy variable model (LSDV). The specific intercepts in (4.1) and the binary regressors in (4.5) have the same source: the unobserved variable that varies across states but not over time

We can add time effects to the entity effects model to have a time and entity fixed effects regression model:

$$Y_{it} = \beta_0 + \beta_1 X_{1t} + \cdots \beta_k X_{kt} + \gamma_2 E_2 + \cdots + \gamma_n E_n + \delta_2 T_2 + \cdots \delta_t T_t + u_{it} \quad (4.6)$$

Tt is time as binary variable (dummy), so we have t-1 time periods. Control for time effects whenever unexpected variation or special events may affect the outcome variable.

Random Effects

Unlike the fixed effects model, the rationale behind random effects model is that, the variation across entities is assumed to be random and uncorrelated with the predictor or independent variables included in the model. Therefore, random effects assume that the entity's error term is not correlated with the predictors which allows for time-invariant variables to play a role as explanatory variables.

The equation of random effects is:

$$Y_{it} = \alpha + X_{it}\beta + u_{it} + \varepsilon_{it} \quad (4.7)$$

u_{it} is between-entity error, while ε_{it} is within-entity error. When dealing with panel data, whether we should use the fixed effects model or the random effects model is a fundamental problem. To decide between fixed or random effects, we can run a Hausman test where the null hypothesis is that the preferred model is random effects, while alternative hypothesis is that fixed effects is more effective than random effects.

4. 2 Sample Selection and Variable Determination

In this section, we will introduce the sources and reasons of our selected data, and then we will list all variables that we have introduced in one table.

4.2.1 Sample Selection

According to the availability and completeness of the data, this thesis analyzes the data of 30 companies operating in China's real estate industry in 2013-2017 that were listed on the Hong Kong Stock Exchange[9]. As we know, in a national economy of a country, the real estate industry has an important position and role. In recent years, China's real estate market has developed rapidly, and the building stock has increased substantially. It has effectively solved some market demand, improved the housing level of urban residents, and promoted economic development. After the financial crisis, China's real estate regulation and control entered the second stage. As the effectiveness of the previous regulation and control was basically affirmed at the central level, and the real estate market continued to be depressed, the local government's fundamentals were obviously improved after 2012. The trading volume gradually recovered, the pressure on real estate enterprises gradually eased, and even the house prices gradually stabilized and rebounded. In the first half of 2013, the investment environment of China's real estate industry has rebounded, the volume of urban residential market has continued to rise, and housing prices in key cities have generally increased. Therefore, we choose the listed companies in China's real estate industry from 2013 to 2017.

All the data in this paper are from the annual reports of the listed companies. The units of currency are Hong Kong Dollars and RMB, we ignore the units of currency as

[9] We can find the companies through their stock codes on the Hong Kong Stock Exchange, this is webpage address: https://www.hkex.com.hk/?sc_lang=en.

they have no influence on our calculated ratios. The analysis software that we used is Stata15.

4.2.2 Variable Determination

Tab.4.1 presents the variables and measurements applied in this research. The liquidity is viewed as the independent variable, while profitability and asset tangibility are viewed as control variables. However, capital structure is considered as the dependent variable, in which the debt asset ratio is measured based on short-term, long-term and total debt.

Tab.4.1 Design of the variables

Variables	Measures	Symbols
Debt Equity Ratio	Total Debt/Equity	debt/equity
Debt Asset Ratio	Total Debt/Asset	debt/asset
Short-Term Debt Asset Ratio	Short-Term Debt/ Asset	st debt/asset
Long-Term Debt Asset Ratio	Long-Term Debt/ Asset	lt debt/asset
Liquidity	Current Assets/Current Liabilities	l
Profitability	EBIT/Total Assets	p
Asset Tangibility	Fixed Assets/Total Assets	t

4.3 Descriptive Statistics

Tab.4.2 Descriptive Statistics of Variables

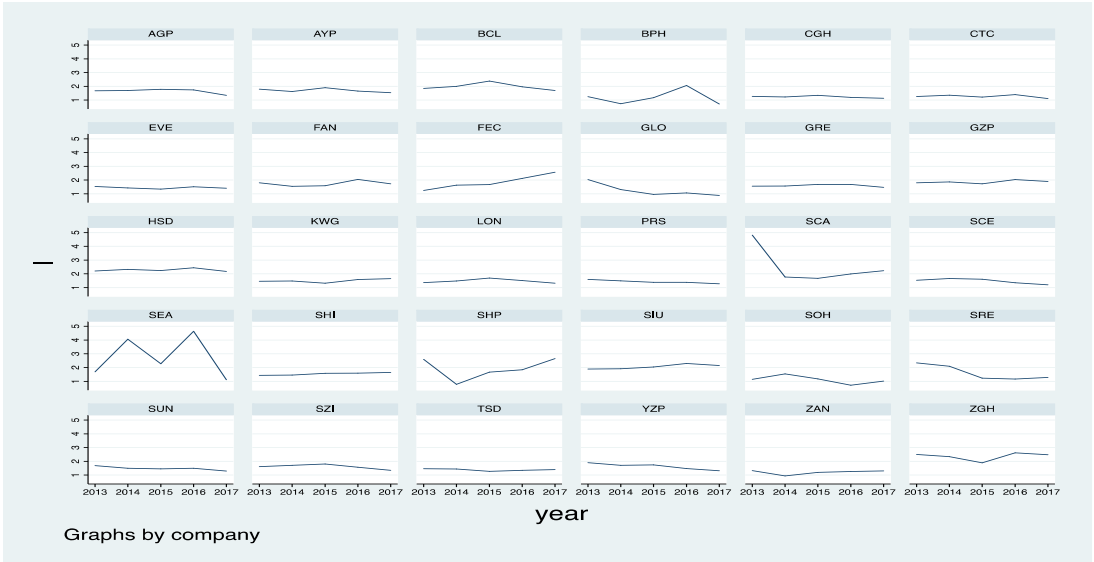
Variable		Mean	Std. Dev.	Min	Max	Observations	
comp	overall	15.5	8.684438	1	30	N =	150
	between		8.803408	1	30	n =	30
	within		0	15.5	15.5	T =	5
year	overall	2015	1.418951	2013	2017	N =	150
	between		0	2015	2015	n =	30
	within		1.418951	2013	2017	T =	5
debteq~y	overall	1.021984	.6846735	.2051093	3.91341	N =	150
	between		.5418051	.3497144	2.434002	n =	30
	within		.4279085	-.2794567	2.666972	T =	5
debtas~t	overall	.2722474	.1113284	.042751	.5821496	N =	150
	between		.0942859	.059873	.4358521	n =	30
	within		.0611787	.1168904	.5546543	T =	5
stdebt~t	overall	.0870248	.0704726	.0053729	.4437668	N =	150
	between		.0588264	.0184844	.3024338	n =	30
	within		.0399842	-.1169079	.286966	T =	5
ltdebt~t	overall	.184375	.0918517	.0113123	.5344788	N =	150
	between		.0744274	.0413886	.3288842	n =	30
	within		.0551905	.0187741	.4305218	T =	5
l	overall	1.689566	.608655	.7135451	4.815151	N =	150
	between		.3941214	1.117639	2.755962	n =	30
	within		.4682939	.0419486	4.078736	T =	5
t	overall	.3340154	.1957003	.0488999	.8643629	N =	150
	between		.187569	.0928275	.7965636	n =	30
	within		.0637256	.0256282	.6372751	T =	5
p	overall	.044498	.043317	-.2789908	.1514804	N =	150
	between		.0289467	-.0461415	.0849765	n =	30
	within		.0325721	-.2089642	.1680883	T =	5

Source: self-elaboration in Stata 15

As shown in Tab.4.2, comp represents the company, the third to sixth rows of the leftmost column represents our four leverage variables. From the data of rightmost column, we can see that this short panel data is strongly balanced. From the middle part, we can see that standard deviation of within estimator of company is equal to 0, which

means that each entity represents the same company. While standard deviation of between estimator of year is equal to 0, which means that different companies have the same time period. The mean value of the variable liquidity is 168.9566%, which indicates that the ratio of total current assets of listed companies to total current liabilities is around 168.9566%. The difference between maximum and minimum numbers is very big, and this shows that these companies makes different decisions on their holding current assets. The mean value of the variable debt equity ratio is 102.1984%, which indicates that the ratio of the total debt of the listed company to the total equity is around 102.1984%. The difference between maximum and minimum numbers is also very big. The mean value of the variable asset tangibility is 33.40154%, which indicates that the ratio of the total fixed assets of the listed company to the total assets is around 33.40154%. The mean value of the variable profitability is 4.4498%, which indicates that the ratio of the total EBIT of the listed company to the total assets is around 4.4498%.

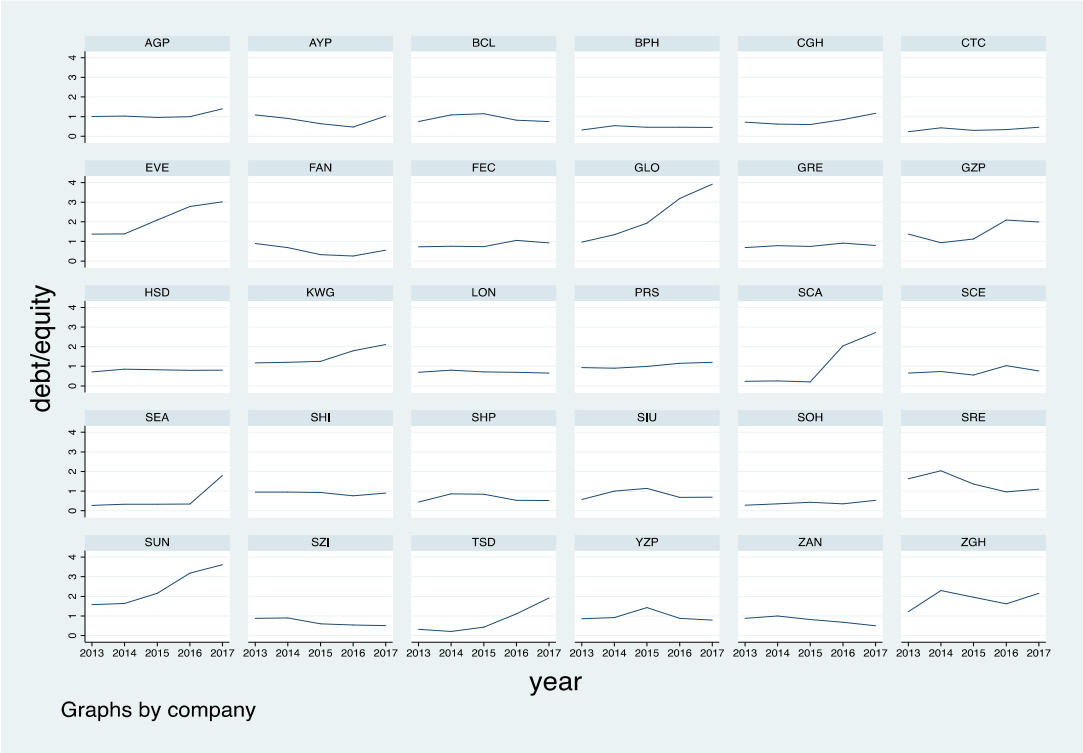
Fig.4.1 Liquidity of Selected Companies



Source: self-elaboration in Stata 15

From Fig.4.1, we can see that most companies have stable development of liquidity ratio, but SEA Group Limited (SEA) and South China Assets Holding Limited (SCA) have higher liquidity ratio than others, which explains the big difference between maximum and minimum number.

Fig.4.2 Debt Equity Ratio of Selected Companies



Source: self-elaboration in Stata 15

From Fig.4.2, we can see that the high debt equity ratio is mostly caused by Glorious Property Holdings Limited (GLO) and Sunac China Holdings Limited (SUN). This two company have no efficient operating, which caused more debts and low equity, so that the leverage gets higher and higher. Most of companies have stable development of debt equity ratio.

4.4 Empirical Results

After we describe the basic features of data form selected companies, we should use fixed effect model and random effect model to get our results. So, we process our four models in turn.

4.4.1 Empirical Analysis of Model 1

In model 1, the dependent variable is debt to equity ratio, independent variables are liquidity, profitability and asset tangibility. We will analyze the pooled OLS, fixed effects and random effects models in turn, and then choose the best model.

Pooled OLS

Tab.4.3 Results of Pooled OLS

Source	SS	df	MS	Number of obs	=	150
				F(3, 146)	=	12.41
Model	14.1940641	3	4.7313547	Prob > F	=	0.0000
Residual	55.6538269	146	.381190595	R-squared	=	0.2032
				Adj R-squared	=	0.1868
Total	69.8478909	149	.468777792	Root MSE	=	.61741

debtequity	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
l	-.1414514	.0886702	-1.60	0.113	-.3166943	.0337915
t	-1.06102	.2614601	-4.06	0.000	-1.577755	-.5442841
p	-4.680606	1.173225	-3.99	0.000	-6.999303	-2.361908
_cons	1.820813	.1912358	9.52	0.000	1.442865	2.198761

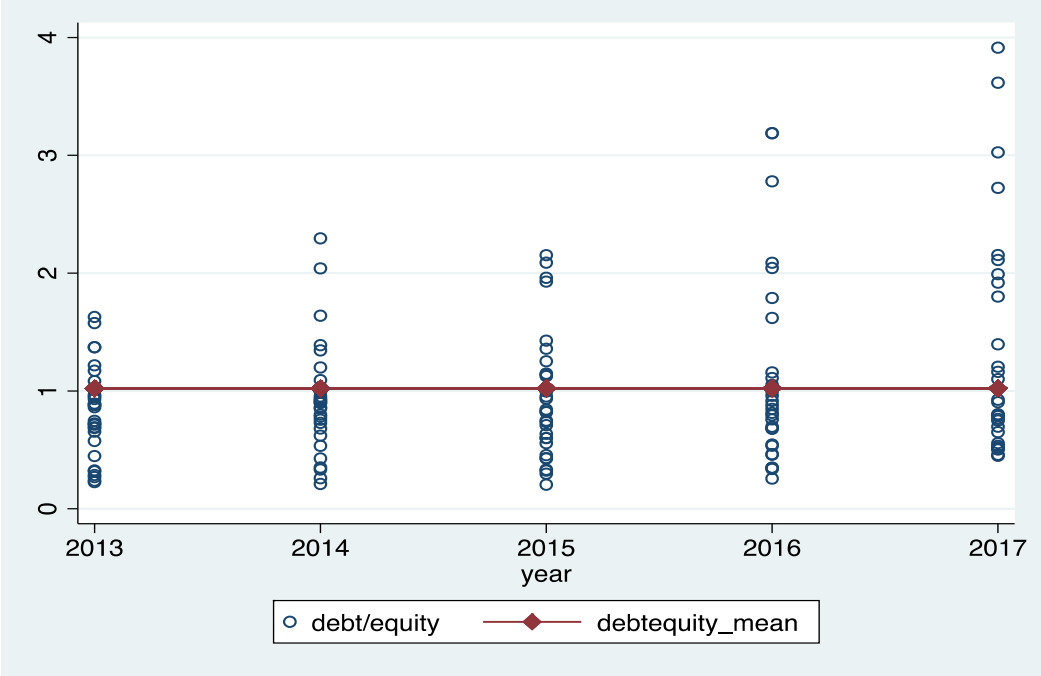
Source: self-elaboration in Stata 15

From the results of F statistic, we can say the model is significant overall. The asset tangibility and profitability are significant at 5% significance level, but asset tangibility is not significant, so we can say this pooled OLS model is not perfect now.

We should compare it with fixed effects and random effects model, and then choose the best model that we can use.

Fixed Effects

Fig.4.3 Heterogeneity Across Years



Source: self-elaboration in Stata 15

Fig.4.3 shows the heterogeneity across years of debt equity ratio, it is unobserved variable that do not change over time, but we can eliminate it through fixed effects. Now, we will make regression by fixed effects model, the results are showed as:

Tab.4.4 Results of Fixed Effects Model

```
Fixed-effects (within) regression               Number of obs      =       150
Group variable: comp                            Number of groups   =        30

R-sq:                                           Obs per group:
     within  = 0.1363                                         min =         5
     between = 0.1698                                         avg =       5.0
     overall = 0.1561                                         max =         5

                                                F(3,117)           =      6.15
corr(u_i, Xb)  = -0.0581                        Prob > F           =    0.0006
```

debtequity	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
l	-.0755425	.0266133	-2.84	0.005	-.1282487	-.0228363
t	-1.185081	.5915104	-2.00	0.047	-2.356536	-.0136257
p	-2.795842	1.14299	-2.45	0.016	-5.059474	-.5322096
_cons	1.684714	.2129036	7.91	0.000	1.263069	2.106358
sigma_u	.49482357					
sigma_e	.44877933					
rho	.54868029	(fraction of variance due to u_i)				

```
F test that all u_i=0: F(29, 117) = 5.64                     Prob > F = 0.0000
```

Source: self-elaboration in Stata 15

On the Tab.4.4, lines three to five show the goodness of fit of the model, which is divided into three levels: within group, between group and overall group. We can see the R-squares of these three levels are 13.63%, 16.98% and 15.61%, the low R-squares do not represent our model is bad, the possibility is that we have just five years' short panel data.

The F statistics and the corresponding P values for the joint test of parameters are listed in line six and line seven respectively, which in this case are 6.15 and 0.0006. It indicates that the parameters are quite significant overall.

Lines eight to eleven shows the estimated coefficients, standard deviations, t-statistics and corresponding P-values for the explanatory variables and the 95% confidence interval, we can see liquidity, asset tangibility and profitability are all

significant at 5% significance level. It's worth mentioning that the coefficient of asset tangibility is equal to -1.185081, which is contrary to our economic theory. This is also probably caused by the short years that we selected, it is too short to reflect the relationship with leverage. The term _cons represents the average number of all individual effects α_i.

The last four lines show the variance estimates for the individual effects and random disturbance terms in the fixed-effects model (sigma_u and sigma_e), and the relationship between them (rho). We can see the rho is around equal to 0.55, which means that the variance of the compound disturbance term (α_i.+ u_{it}) mainly comes from the change of variation of the individual effect α_i.

The last line gives an estimation of whether the fixed effects model is significant for the F statistic and the corresponding P value. In this case, we can see that the F statistic is 5.64 and P value is 0.0000, so the null hypothesis is strongly rejected, that is, fixed effects model is clearly superior to pooled OLS model, and each individual should be allowed to have its own intercept term.

Also, time effects can also be considered in the fixed effects model, for example, the Two-way fixed effects model. Then, we get the results of Two-way fixed effects model in the Tab.4.5.

Tab.4.5 Results of Two-way Fixed Effects Model

debtequity	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
l	-.2374476	.0949227	-2.50	0.014	-.4255067	-.0493886
t	-1.749753	.5907125	-2.96	0.004	-2.920061	-.5794451
p	-1.348753	1.209833	-1.11	0.267	-3.74565	1.048145
year						
2014	.0672716	.1086883	0.62	0.537	-.1480595	.2826026
2015	.0623442	.1107452	0.56	0.575	-.157062	.2817503
2016	.2399417	.1154135	2.08	0.040	.0112867	.4685967
2017	.4660225	.1098928	4.24	0.000	.2483051	.6837399
_cons	1.89575	.2942969	6.44	0.000	1.312694	2.478805
sigma_u	.50681313					
sigma_e	.41567592					
rho	.59783994	(fraction of variance due to u_i)				

F test that all u_i=0: F(29, 113) = 6.40 Prob > F = 0.0000

Source: self-elaboration in Stata 15

In Tab.4.5, the year 2013 is seen as base year, it is reflected in the _cons term. But it is not included in the above regression command, otherwise, a dummy variable trap will occur, resulting in full multicollinearity. The signs of time effects are all positive, but some annual dummy variables such as year2016 and year2017 are significant, while others such as year2014 and year2015 are not significant. Then, we can use a joint test to see if the dummies for all years are equal to 0, if they are then no time fixed effects are needed.

Tab.4.6 Joint Test

```
( 1)  2014.year = 0
( 2)  2015.year = 0
( 3)  2016.year = 0
( 4)  2017.year = 0

       F(  4,    113) =     6.08
            Prob > F =     0.0002
```

Source: self-elaboration in Stata 15

From Tab.4.6, it shows that the P value is less than 0.05, so we should reject the null hypothesis that the coefficients for all years are jointly equal to zero, therefore time fixed- effects are needed in this case.

Random Effects

Tab.4.7 Results of Random Effects Model

```
Random-effects GLS regression                   Number of obs     =       150
Group variable: comp                            Number of groups  =        30

R-sq:                                           Obs per group:
     within  = 0.1322                                         min =         5
     between = 0.1974                                         avg =       5.0
     overall = 0.1719                                         max =         5

                                                Wald chi2(3)      =     25.07
corr(u_i, X)   = 0 (assumed)                    Prob > chi2       =    0.0000
```

debtequity	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
l	-.0595745	.0251278	-2.37	0.018	-.1088241	-.010325
t	-1.085844	.3708456	-2.93	0.003	-1.812689	-.3590004
p	-3.317252	1.073297	-3.09	0.002	-5.420875	-1.213629
_cons	1.644651	.1649438	9.97	0.000	1.321367	1.967935
sigma_u	.42768776					
sigma_e	.44877933					
rho	.47594963	(fraction of variance due to u_i)				

Source: self-elaboration in Stata 15

From Tab.4.7, the result of random effects is similar with fixed effects, because the P value is less than 0.05, we can say the model is significant overall. The three explanatory variables liquidity, asset tangibility and profitability are all significant at 5% significance level. The R-squares of three levels are 13.22%, 19.74% and 17.19%, similarly, it has no influence on our analysis.

Then, for testing whether random effect is significant, we use the Breusch and Pagan Lagrangian multiplier test. The null hypothesis in the LM test is that variances

across entities is zero. This is, no significant difference across units. We can see the result of LM test in Tab.4.8.

Tab.4.8 Results of LM Test

```
Breusch and Pagan Lagrangian multiplier test for random effects

        debtequity[comp,t] = Xb + u[comp] + e[comp,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+------------------------------
                debtequ~y|    .4687778       .6846735
                       e|    .2014029       .4487793
                       u|    .1829168       .4276878

        Test:   Var(u) = 0
                                 chibar2(01) =    59.38
                              Prob > chibar2 =   0.0000
```

Source: self-elaboration in Stata 15

From the results, we can see the P value is 0.0000<0.05, so we should reject the null hypothesis and conclude that random effects model is appropriate. There is an evidence of significant differences across companies, therefore we can run the random effects model.

After that, we use Hausman test to decide whether fixed effects model or random effects model we should process.

Tab.4.9 Hausman Test

	Coefficients (b) fe_result	(B) re_result	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
l	**-.0755425**	**-.0595745**	**-.015968**	**.0087671**
t	**-1.185081**	**-1.085844**	**-.0992365**	**.4608232**
p	**-2.795842**	**-3.317252**	**.5214101**	**.3930151**

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(**3**) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= **5.93**
Prob>chi2 = **0.1152**

Source: self-elaboration in Stata 15

From the result of Hausman test, because P value is more than 0.05, we conclude that we should accept null hypothesis, that is, we will use random effect model rather than fixed effects model.

According to the results of random effects model, we can see the liquidity has negative relationship with debt equity ratio. Profitability is negatively related to debt equity ratio, which verify the conclusion of Ozkan(2001), Gaud et al.(2003), Bevan and Danbolt(2002). However, asset tangibility has negative relationship with debt equity ratio, this result is contrary to the conclusion of Jensen and Meckling(1976), Bennett and Donnelly (2003), Rajan and Zingales(1995) and Gaud et al.(2003). However, we get the same result with the conclusion of Bevan and Danbolt(2000) and Psillaki and Daskalakis(2008).

4.4.2 Empirical Analysis of Model 2

In model 2, the dependent variable is debt to asset ratio, independent variables are not changed. The panel data of model 2 is also analyzed by pooled OLS model, fixed effects model and random effects model, and the analysis results are shown in Tab.4.10.

Tab.4.10 Results of Three Models in Model 2.

Variable	OLS	FE	RE
l	.02780428	-.01984783	-.00496696
t	.02346414	-.14757563	-.04528292
p	-.76876814***	-.33060783	-.46528431**
_cons	.25219924***	.36938734***	.31636914***
N	150	150	150
F	5.7947217	3.3269098	

legend: * p<0.05; ** p<0.01; *** p<0.001

Source: self-elaboration in Stata 15

From the regression results and F values in Tab.4.10, we can see both pooled OLS model, fixed effects model are feasible, but fixed effects model is better than pooled OLS model. Finally, the Hausman test is applied to test the fixed effects model and the random effects model, the result is showed in Tab.4.11.

Tab.4.11 Hausman Test

	Coefficients			
	(b) FE	(B) RE	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
l	-.0198478	-.004967	-.0148809	.0063591
t	-.1475756	-.0452829	-.1022927	.068669
p	-.3306078	-.4652843	.1346765	.0640583
_cons	.3693873	.3163691	.0530182	.0250872

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 5.82
Prob>chi2 = 0.2131
(V_b-V_B is not positive definite)

Source: self-elaboration in Stata 15

Since the P value is 0.2131, which is more than 0.05, so we are failed to reject null hypothesis, and it is considered that the random effects model should be used instead of the fixed effects model.

Therefore, we can get conclusion through the results of random effects model. The liquidity also has negative relationship with debt asset ratio. Profitability is negatively related to debt asset ratio, which verify the conclusion of Ozkan(2001), Gaud et al.(2003), Bevan and Danbolt(2002). Similar with model 1, the asset tangibility also has negative relationship with debt asset ratio, so we get the same result with the conclusion of Bevan and Danbolt(2000) and Psillaki and Daskalakis(2008).

4.4.3 Empirical Analysis of Model 3

In model 3, we need explore the impacts of independent variables on short-term leverage. According to the above process, the panel data of model 3 is also analyzed by pooled OLS model, fixed effects model and random effects model, and the analysis results are shown in Tab.4.12.

Tab.4.12. Results of Three Models in Model 3.

Variable	OLS	FE	RE
l	-.01983138*	-.04768952***	-.0365629***
t	-.01769976	-.20722678***	-.0987895*
p	-.49990095***	.01197548	-.12397633
_cons	.14828993***	.23532671***	.18658062***
N	150	150	150
F	7.0077603	12.270589	

legend: * p<0.05; ** p<0.01; *** p<0.001

Source: self-elaboration in Stata 15

From the results and F values in Tab.4.12, we can see both pooled OLS model, fixed effects model are feasible, but fixed effects model is better than pooled OLS model. After that, the Hausman test is applied to test the fixed effects model and the random effects model, the result is showed in Tab.4.13.

Tab.4.13 Hausman Test

	Coefficients (b) FE	(B) RE	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
l	-.0476895	-.0365629	-.0111266	.0038094
t	-.2072268	-.0987895	-.1084373	.0413537
p	.0119755	-.1239763	.1359518	.0382814
_cons	.2353267	.1865806	.0487461	.0148275

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 13.23
Prob>chi2 = 0.0102
(V_b-V_B is not positive definite)

Source: self-elaboration in Stata 15

Because the P value is 0.0102, which is less than 0.05, we should reject null hypothesis, and it is considered that the fixed effects model should be used instead of the random effects model.

Therefore, we can get conclusion through the results of fixed effects model. Likewise model 1 and model 2, the liquidity has negative relationship with short-term leverage. Surprisingly, profitability is positively related to short-term leverage, which is different with model 1 and model 2. As same with above models, the asset tangibility

also has negative relationship with short-term leverage, which is similar with the conclusion of Bevan and Danbolt(2000) and Psillaki and Daskalakis(2008).

4.4.4 Empirical Analysis of Model 4

In model 4, we want to know how independent variables influence the long-term leverage. Similar with the above process, the panel data of model 4 is analyzed by pooled OLS model, fixed effects model and random effects model, and the analysis results are shown in Tab.4.14.

Tab.4.14 Results of Three Models in Model 4.

Variable	OLS	FE	RE
l	.04916285***	.02390103	.03110619**
t	.04614042	.01839835	.03875658
p	-.26816066	-.32666392*	-.33279136*
_cons	.09881839***	.15286267***	.13430632***
N	150	150	150
F	5.9726557	2.0087823	

legend: * p<0.05; ** p<0.01; *** p<0.001

Source: self-elaboration in Stata 15

From the results and F values in Tab.4.14, we can see both pooled OLS model, fixed effects model are feasible, but fixed effects model is better than pooled OLS model. And then the Hausman test is applied to test the fixed effects model and the random effects model, the result is showed in Tab.4.15.

Tab.4.15 Hausman Test

	Coefficients (b) FE	(B) RE	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
l	.023901	.0311062	-.0072052	.006384
t	.0183983	.0387566	-.0203582	.0666616
p	-.3266639	-.3327914	.0061274	.0652562
_cons	.1528627	.1343063	.0185563	.0262361

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 2.76
Prob>chi2 = 0.5980
(V_b-V_B is not positive definite)

Source: self-elaboration in Stata 15

From the result of Tab.4.15, we can see the P value is 0.5980, which is more than 0.05, we are failed to reject null hypothesis, and we should use the random effects model rather than the fixed effects model.

Therefore, we can get conclusion through the results of random effects model. Different to previous models, the liquidity has positive relationship with long-term leverage. Surprisingly, the asset tangibility has positive relationship with long-term leverage, this relationship happens at first time. Similar to model 1 and model2, profitability is negatively related to long-term leverage.

4.5 Findings

In this section, we mainly focus on the test of our hypothesis presented in chapter three, and we need to see whether our results are consistent with past studies and capital structure theories.

4.5.1 Liquidity

Liquidity is calculated as the ratio of current assets to current liabilities. Through our results, we find liquidity is significant negatively related to all types of leverage except long-term leverage. Therefore, we can accept hypothesis 1A and 1B, reject hypothesis 1C. Our results mostly are in consistent with the theory of Ozkan (2001), this inverse relation may arise from potential conflicts between shareholders and debtholders. In other words, firms with high level of liquidity have more liquid assets and hold less amount of debt, which leads to lower leverage.

4.5.2 Profitability

Profitability is calculated as the ratio of EBIT to total assets. Our regression results of models have shown that profitability has negative relationship with leverage except for short-term leverage. Thus, we can accept hypothesis 2A and 2C, reject hypothesis 2B. Overall our results reflect the pecking order theory. Based on pecking order theory, if a firm makes profits, it prefers considering retained earnings as a primary source of financing new investments, in other words, profitable firms prefer internal financing rather than external financing. But overall our results do not support the trade off theory, this theory indicates that firms with high profits tend to have leverage and more taxable income to shield, only relationship between profitability and short-term leverage can prove this theory.

4.5.3 Asset Tangibility

Asset tangibility is calculated as the ratio of fixed assets to total assets. The results show that there is mix correlation between asset tangibility and different leverages. In model 1, model 2 and model 3, asset tangibility is negatively correlated to total and short-term leverage. On the contrary, it has positive relationship with long-term leverage. Hence, we should reject hypothesis 3A and 3B, accept hypothesis 3C. It is consistent with the theory that firms are more likely to employ long-term debt for fixed assets. This is because the tangible assets are easy to collateralize and therefore it decreases the agency cost of debt (Rajan and Zingales(1995).

5. Conclusion

Our main aim is to find the relationships between capital structure and asset liquidity, in addition, we add some other variables such as asset tangibility and profitability. This research covers 30 listed Chinese companies from annual reports in real estate industry from 2013 to 2017. In the theoretical part, we introduced the importance of liquidity and the link between capital structure and asset liquidity. In the practical part, we used Stata15 to find relationship between capital structure and asset liquidity and verified our hypotheses.

In this chapter, we firstly summarize the previous researches, then illustrate the policy recommendations and research outlook.

According to four regression models, generally we can say leverage is negatively related to liquidity and profitability. While asset tangibility only has positive relationship with long-term leverage. As mentioned in previous chapter, regression results are consistent with different capital structure theories. The negative correlation between profitability and leverage supports the pecking order theory, the positive correlation between asset tangibility and long-term leverage supports the agency theory. In past chapters, we also mention that some scholars hold different opinions of capital structure theories. For example, Gaud et al. (2005) supports negative correlation between profitability and leverage, while Jensen (1986) indicates that there is positive relationship between profitability and leverage. In a word, the contradictions of capital structure theories are normal, they complement each other.

Under the conclusion of this thesis, when there is too much debt financing, it will cause insufficient liquidity. At the same time, when the financing cost is high, the firms adjust the capital structure to reduce the financial leverage, which may cause excess liquidity within the enterprise. Therefore, when the enterprise adjusts its capital structure, it should take into account the liquidity, so as to rationally control the flow of assets and improve the efficiency of funds using.

What's more, strengthening the construction of laws and regulations, improving the market environment and increase transparency in the financing market should be implemented, so that investors and firms can effectively obtain sufficient resources and less transaction costs.

There are several limitations in this research. Firstly, we use only three independent variables, and maybe there are some other influencing variables we have ignored. Secondly, the number of selected listed companies is only 30, which is a limited sample. Thirdly, we just choose the time period from 2013 to 2017, so we cannot expect to get perfect results from such short panel data.

Therefore, using different independent variables will get more precise results. The sample size of further research can be extended with unlisted or small firms to get more reliable results. Also, the further research can extend the period of time and examine capital structure over long time period to produce more reliable and accurate results.

Bibliography

Professional Book

[1] SHLEIFER Andrei and Robert VISHNY. *Fire Sales in Finance and Macroeconomics*. Journal of Economic Perspectives. 2011, No.1, p.29.ISSN 0895-3309.

[2] KORAJCZYK Robert A. and Amnom LEVY. *Capital Structure Choice: Macroeconomic Conditions and Financial Constraints*. Journal of Financial Economics. 2003, No 1, p .75. ISSN: 0304-405X.

[3] KNOOP Todd A. *Modern Financial Mcroeconomics: Panics, Crashes, and Crisis.* Malden: Wiley-Blackwell, 2008. ISBN 978-4051-6180-0.

Economic Bibliography

[4] Katherine Bentley. *The 2008 Financial Crisis: How Deregulation Led to the Crisis.* [online]. 2015. Available on https://publications.lakeforest.edu/cgi/viewcontent.cgi?article=1054&context=seniortheses.

[5] Huw Dixon. *Reflections on New Keynesian Economics.* [online]. 2015. Available on http://huwdixon.org/SurfingEconomics/chapter4.pdf

[6] Sher Verick and Iyanatul Islam. *The Great Recession of 2008-2009.* [online]. 2010. Available on http://ftp.iza.org/dp4934.pdf

[7] DM. NACHANE. *Dynamic Stochastic General Equilibrium (DSGE) Theory.* [online]. 2016. Available on http://www.igidr.ac.in/pdf/publication/WP-2016-004.pdf.

[8] Claudia M. Buch. *Evaluating macroprudential policies.* [online]. 2018. Available on https://www.esrb.europa.eu/pub/pdf/wp/esrb.wp76.en.pdf?ab39ce65cf03a5f6fc247c13aac8d9ef.

[9] Robert BOYER. *Macroeconomics After the Crisis.* [online]. 2011. Available on http://robertboyer.org/download/Macroeconomics%20after%20the%20Crisis.pdf.

[10] Paul J. J. Welfens. *Issues of modern macroeconomics: new post-crisis perspectives on the world economy.* [online]. 2014. Available on https://link.springer.com/article/10.1007/s10368-014-0299-2.

[11] Ítalo Pedrosa and Maryse Farhi. *Macroeconomic theory in the aftermath of the crisis: mainstream and new Keynesianism.* [online]. 2015. Available on http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0103-63512015000200237.

[12] Robert W. Vishny. *Fire Sales in Finance and Macroeconomics.* [online]. 2010, December. Available on

https://www.nber.org/papers/w16642.

[13] European Economy. *Enlargement,Two Years After – An Economic Evaluation* [online]. 2006. Available on

http://ec.europa.eu/economy_finance/publications/pages/publication7548_en.pdf.

[14] CRS Report for Congress. Federal Funds Rate. [online]. Available on

https://crsreports.congress.gov/.

[15] International Monetary Fund. House Price. [online]. Available on

https://www.imf.org/external/index.htm.

[16] National Bureau of Statisitics. [online]. Available on

http://www.stats.gov.cn/english/.

An Article in a Journal or in Proceedings

[17] Modigliani, F. and Miller, M. *The cost of capital, corporation finance and the theory of investment*. The American Economic Review, 1958.

[18] Keynes J M. *Treatise on money: Pure theory of money*. 1930.

[19] Keynes J M. *General theory of employment, interest and money.* Atlantic Publishers &Dist, 2006.

[20] Harris M, Raviv A. *Capital structure and the informational role of debt*. The

Journal of Finance, 1990.

[21] Van Horne B. *Density as a misleading indicator of habitat quality*. J Wildl Manage, 1983.

[22] 0’ hara M. *Market microstructure theory*. Cambridge, MA: Blackwell, 1995.

[23] Fama E F, French K R. *Testing trade-off and pecking order predictions about dividends and debt.* Review of financial studies, 2002.

[24] DeAngelo H, DeAngelo L, Wruck K H. *Asset liquidity, debt covenants, and managerial discretion in financial distress: the collapse of LA Gear.* Journal of Financial Economics, 2002.

[25] Myers S C, Majluf N S. *Corporate financing and investment decisions when firms have information that investors do not have*. Journal of financial economics, 1984.

[26] Berger P G, Ofek E, Yermack D L. *Managerial entrenchment and capital structure decisions*. The Journal of Finance, 1997.

[27] Wald J K, Long M S. *The effect of state laws on capital structure*. Journal of Financial Economics, 2007.

[28] Garvey G T, Hanka G. *Capital structure and corporate control: The effect of antitakeover statutes on firm leverage*. The Journal of Finance, 1999.

[29] Lemmon M L, Lins K V. *Ownership structure, corporate governance, and firm value: Evidence from the East Asian financial crisis*. The journal of finance, 2003.

[30] Williamson 0 E. *Corporate finance and corporate governance*. The journal of finance, 1988.

[31] Shleifer A, Vishny R W. *Liquidation values and debt capacity: A market*

equilibrium approach. The Journal of Finance, 1992.

[32] Berger P G, Ofek E, Yermack D L. *Managerial entrenchment and capital structure decisions*. The Journal of Finance, 1997.

[33] Litov L P. *Corporate governance and financing policy: New evidence*. Manuscript, Stern School of Business, New York University, 2005.

[34] Ozkan, A. *Determinants of capital structure and adjustment to long run target: evidence from UK company panel data*. The Journal of Finance, 2001.

[35] Oztekin, O. *Capital structure decisions around the world: which factors are reliably important*. The Journal of Finance, 2009.

[36] Bevan, A.A. and Danbolt, J. *Capital structure and its determinants in the United Kingdom – A decompositional analysis.* Applied financial economics, 2002.

[37] Gaud, P, E. Jani, M. Hoesli and A. Bender. The capital structure of Swiss companies: An empirical analysis using dynamic panel data. European financial management, 2003.

[38] Jensen, M. And Meckling, W. *Theory of The Firm: Managerial Behaviour, Agency Costs and Ownership Structure*. Journal of Financial Economics, 1976.

[39] Bennett, M. and R. Donnelly. *The Determinants of Capital Structure: Some UK Evidence*. British Accounting Review, 2003.

[40] Rajan, R. and Zingales L. *What Do We Know about Capital Structure? Some Evidence from International Data*. Journal of Finance, 1995.

[41] Myers, S.C. *The Capital Structure Puzzle*. Journal of Finance, 1984.

List of Abbreviations

DSGE	Dynamic Stochastic General Equilibrium
EBA	European Banking Authority
EBIT	Earnings before Interest and Tax
EIOPA	European Insurance and Occupational Pensions Authority
ESA	European Supervisory Authorities
ESMA	European Securities and Markets Authority
ESRB	European Systemic Risk Board
FE	Fixed Effects
Fed	Federal Reserve System
GFC	Global Financial Crisis
GSE	Government Sponsored Enterprises
HK	Hong Kong
IMF	International Monetary Fund
LSDV	Least Square Dummy Variable Model
OECD	Organization for Economic Co-operation and Development
OLS	Ordinary Least Squares
RE	Random Effects

Declaration of Utilzation of Results from the Diploma Thesis

Herewith I declare that

- I am informed that Act No. 121/2000 Coll. – the Copyright Act, in particular, Section 35 – Utilisation of the Work as a Part of Civil and Religious Ceremonies, as a Part of School Performances and the Utilisation of a School Work – and Section 60 – School Work, fully applies to my diploma thesis;
- I take account of the VSB – Technical University of Ostrava (hereinafter as VSB-TUO) having the right to utilize the diploma thesis (under Section 35(3)) unprofitably and for own use;
- I agree that the diploma thesis shall be archived in the electronic form in VSB-TUO's Central Library. I agree that the bibliographic information about the diploma thesis shall be published in VSB-TUO's information system;
- It was agreed that, in case of VSB-TUO's interest, I shall enter into a license agreement with VSB-TUO, granting the authorization to utilize the work in the scope of Section 12(4) of the Copyright Act;
- It was agreed that I may utilize my work, the diploma thesis or provide a license to utilize it only with the consent of VSB-TUO, which is entitled, in such a case, to claim an adequate contribution from me to cover the cost expended by VSB-TUO for producing the work (up to its real amount).

Ostrava dated 26.04.2019

Kunli Wang

Student's name and surname

List of Annexes

Annex 1: List of Companies Analyzed

Name	Abbreviation	HK Stock Code
Agile Property Holdings Limited	AGP	3383
Beijing Capital Land Ltd.	BCL	2868
Beijing Properties (Holdings) Limited	BPH	925
Central China Real Estate Limited	CTC	0832
China Aoyuan Properties Company Limited	AYP	3883
China SCE Property Holdings Limited	SCE	1966
Country Garden Holdings Company Limited	CGH	2007
Evergrande Real Estate Group Limited	EVE	3333
Fantasia Holdings Group Co.Limited	FAN	1777
Far East Consortium International Limited	FEC	0035
Glorious Property Holdings Limited	GLO	0845
Greentown China Holdings Limited	GRE	3900
Guangzhou R&F Properties Co., Ltd	GZP	2777
Hopson Development Holdings Limited	HSD	754
Kwg Property Holding Limited	KWG	1813
Long Properties Co. Ltd.	LON	1238

Powerlong Real Estate Holdings Limited	PRS	1238
SEA Group	SEA	0251
Shanghai Industrial Urban Development Group Limited	SIU	0563
Shenzhen Investment Limited	SZI	604
Shimao Property Holdings Limited	SHI	0813
Sino Harbour Property Group Limited	SHP	1663
SOHO China	SOH	410
South China Assets Holdings Limited	SCA	8155
SRE Group Limited	SRE	1207
Sunac China Holdings Limited	SUN	1918
Tian Shan Development (Holding) Limited	TSD	2118
Yuzhou Properties Company Limited	YZP	1628
Zhong An Real Estate Limited	ZAN	0672
Zhuguang Holdings Group Company Limited	ZGH	1176

Annex 2: Panel Data of Companies Analyzed

company	year	d/e	d/a	st d/a	lt d/a	l	t	p
PRS	2013	0.93	0.34	0.09	0.24	1.60	0.48	0.04
PRS	2014	0.90	0.33	0.08	0.25	1.49	0.51	0.04
PRS	2015	1.00	0.34	0.09	0.25	1.38	0.52	0.03
PRS	2016	1.16	0.38	0.10	0.28	1.38	0.53	0.06
PRS	2017	1.21	0.37	0.10	0.27	1.28	0.52	0.07
CGH	2013	0.72	0.16	0.05	0.11	1.27	0.44	0.06
CGH	2014	0.62	0.14	0.05	0.10	1.23	0.28	0.06
CGH	2015	0.60	0.15	0.06	0.09	1.35	0.25	0.04
CGH	2016	0.85	0.12	0.05	0.07	1.20	0.18	0.04
CGH	2017	1.16	0.13	0.05	0.08	1.13	0.17	0.04
GZP	2013	1.37	0.33	0.02	0.31	1.80	0.24	0.10
GZP	2014	0.93	0.28	0.02	0.27	1.87	0.23	0.07
GZP	2015	1.13	0.30	0.03	0.27	1.72	0.22	0.07
GZP	2016	2.09	0.43	0.05	0.39	2.04	0.21	0.06
GZP	2017	1.99	0.43	0.05	0.38	1.90	0.28	0.10
SHP	2013	0.45	0.23	0.04	0.19	2.60	0.22	0.09
SHP	2014	0.86	0.22	0.07	0.14	0.78	0.17	0.04
SHP	2015	0.84	0.31	0.19	0.13	1.67	0.18	0.04
SHP	2016	0.53	0.24	0.11	0.13	1.84	0.27	0.04
SHP	2017	0.52	0.26	0.07	0.19	2.65	0.26	0.04
KWG	2013	1.17	0.34	0.05	0.29	1.46	0.41	0.06
KWG	2014	1.20	0.34	0.05	0.29	1.48	0.42	0.06
KWG	2015	1.25	0.35	0.05	0.30	1.32	0.47	0.06
KWG	2016	1.79	0.39	0.04	0.34	1.58	0.32	0.04
KWG	2017	2.11	0.44	0.03	0.41	1.65	0.39	0.04
EVE	2013	1.37	0.31	0.10	0.21	1.54	0.17	0.07
EVE	2014	1.39	0.33	0.17	0.16	1.43	0.19	0.06

EVE	2015	2.09	0.39	0.21	0.18	1.34	0.19	0.04
EVE	2016	2.78	0.40	0.15	0.25	1.52	0.18	0.04
EVE	2017	3.02	0.42	0.20	0.21	1.40	0.14	0.05
GLO	2013	0.97	0.35	0.10	0.26	2.03	0.30	0.01
GLO	2014	1.34	0.41	0.29	0.12	1.31	0.27	-0.05
GLO	2015	1.93	0.46	0.44	0.01	0.96	0.32	-0.07
GLO	2016	3.19	0.50	0.34	0.17	1.06	0.34	-0.09
GLO	2017	3.91	0.45	0.34	0.11	0.89	0.36	-0.04
FAN	2013	0.89	0.23	0.07	0.16	1.80	0.29	0.08
FAN	2014	0.68	0.19	0.10	0.09	1.55	0.32	0.06
FAN	2015	0.32	0.09	0.03	0.06	1.59	0.30	0.06
FAN	2016	0.26	0.07	0.02	0.05	2.05	0.35	0.05
FAN	2017	0.56	0.14	0.04	0.10	1.73	0.33	0.04
CTC	2013	0.23	0.05	0.02	0.03	1.26	0.25	0.06
CTC	2014	0.43	0.08	0.03	0.05	1.36	0.20	0.05
CTC	2015	0.30	0.05	0.03	0.03	1.22	0.26	0.04
CTC	2016	0.34	0.05	0.01	0.04	1.39	0.23	0.02
CTC	2017	0.46	0.06	0.01	0.05	1.10	0.25	0.03
LON	2013	0.69	0.19	0.06	0.13	1.36	0.32	0.09
LON	2014	0.80	0.24	0.05	0.19	1.48	0.35	0.08
LON	2015	0.71	0.24	0.03	0.21	1.69	0.35	0.08
LON	2016	0.70	0.23	0.02	0.21	1.51	0.38	0.07
LON	2017	0.65	0.19	0.01	0.18	1.32	0.36	0.07
GRE	2013	0.69	0.18	0.05	0.13	1.56	0.17	0.07
GRE	2014	0.78	0.21	0.10	0.12	1.57	0.16	0.05
GRE	2015	0.75	0.19	0.09	0.10	1.68	0.15	0.02
GRE	2016	0.92	0.21	0.06	0.15	1.68	0.13	0.02
GRE	2017	0.79	0.16	0.05	0.10	1.47	0.10	0.03
SUN	2013	1.58	0.29	0.08	0.21	1.69	0.09	0.06
SUN	2014	1.64	0.31	0.12	0.18	1.50	0.13	0.03

SUN	2015	2.15	0.36	0.13	0.24	1.45	0.19	0.05
SUN	2016	3.19	0.38	0.11	0.27	1.50	0.14	0.02
SUN	2017	3.62	0.35	0.13	0.23	1.30	0.20	0.04
SHI	2013	0.95	0.24	0.07	0.21	1.43	0.14	0.07
SHI	2014	0.95	0.28	0.08	0.20	1.45	0.29	0.07
SHI	2015	0.93	0.29	0.07	0.22	1.58	0.28	0.06
SHI	2016	0.76	0.26	0.07	0.19	1.60	0.28	0.06
SHI	2017	0.90	0.28	0.06	0.23	1.64	0.28	0.06
BCL	2013	0.75	0.11	0.02	0.19	1.85	0.13	0.04
BCL	2014	1.09	0.30	0.07	0.23	1.99	0.14	0.04
BCL	2015	1.15	0.27	0.03	0.24	2.38	0.19	0.04
BCL	2016	0.81	0.19	0.02	0.17	1.97	0.21	0.03
BCL	2017	0.75	0.17	0.01	0.16	1.69	0.21	0.03
TSD	2013	0.33	0.34	0.02	0.05	1.46	0.13	0.04
TSD	2014	0.21	0.04	0.01	0.04	1.44	0.12	0.06
TSD	2015	0.43	0.07	0.03	0.05	1.27	0.11	0.03
TSD	2016	1.11	0.14	0.05	0.09	1.35	0.07	0.02
TSD	2017	1.92	0.19	0.06	0.13	1.40	0.06	0.02
AGP	2013	1.01	0.32	0.11	0.22	1.68	0.28	0.09
AGP	2014	1.03	0.34	0.13	0.21	1.70	0.24	0.08
AGP	2015	0.95	0.34	0.14	0.20	1.78	0.23	0.07
AGP	2016	1.00	0.33	0.10	0.24	1.74	0.27	0.07
AGP	2017	1.40	0.38	0.17	0.21	1.35	0.31	0.10
YZP	2013	0.86	0.24	0.07	0.16	1.90	0.20	0.09
YZP	2014	0.92	0.22	0.10	0.12	1.71	0.24	0.07
YZP	2015	1.43	0.28	0.08	0.20	1.75	0.15	0.06
YZP	2016	0.88	0.15	0.07	0.08	1.47	0.24	0.06
YZP	2017	0.79	0.17	0.08	0.09	1.32	0.21	0.08
AYP	2013	1.08	0.27	0.08	0.19	1.79	0.11	0.04
AYP	2014	0.91	0.22	0.12	0.10	1.63	0.10	0.04

AYP	2015	0.64	0.15	0.05	0.10	1.90	0.12	0.03
AYP	2016	0.46	0.10	0.05	0.06	1.66	0.10	0.03
AYP	2017	1.02	0.22	0.11	0.11	1.54	0.08	0.03
SCE	2013	0.65	0.21	0.09	0.12	1.53	0.40	0.07
SCE	2014	0.73	0.23	0.11	0.13	1.66	0.32	0.07
SCE	2015	0.56	0.16	0.10	0.07	1.61	0.31	0.06
SCE	2016	1.03	0.24	0.07	0.18	1.35	0.39	0.07
SCE	2017	0.76	0.19	0.07	0.12	1.20	0.37	0.08
ZAN	2013	0.88	0.32	0.05	0.27	1.33	0.55	0.05
ZAN	2014	1.00	0.34	0.10	0.24	0.94	0.63	0.03
ZAN	2015	0.82	0.28	0.10	0.18	1.20	0.48	0.05
ZAN	2016	0.68	0.26	0.11	0.15	1.26	0.48	0.01
ZAN	2017	0.50	0.20	0.07	0.13	1.30	0.45	0.06
SOH	2013	0.29	0.14	0.04	0.11	1.14	0.72	0.15
SOH	2014	0.35	0.18	0.02	0.17	1.54	0.77	0.08
SOH	2015	0.43	0.23	0.03	0.20	1.18	0.80	0.03
SOH	2016	0.35	0.18	0.04	0.14	0.71	0.86	0.04
SOH	2017	0.53	0.25	0.04	0.21	1.02	0.83	0.12
BPH	2013	0.32	0.20	0.04	0.17	1.25	0.85	0.14
BPH	2014	0.53	0.24	0.09	0.15	0.74	0.82	0.03
BPH	2015	0.46	0.18	0.16	0.02	1.17	0.66	0.03
BPH	2016	0.46	0.20	0.02	0.18	2.07	0.73	0.01
BPH	2017	0.45	0.17	0.01	0.16	0.72	0.85	0.02
HSD	2013	0.71	0.29	0.07	0.22	2.20	0.29	0.05
HSD	2014	0.85	0.34	0.09	0.26	2.32	0.31	0.03
HSD	2015	0.83	0.33	0.08	0.25	2.23	0.34	0.02
HSD	2016	0.79	0.34	0.07	0.26	2.44	0.36	0.04
HSD	2017	0.80	0.35	0.10	0.24	2.17	0.41	0.06
SCA	2013	0.24	0.19	0.03	0.16	4.82	0.48	0.10
SCA	2014	0.26	0.15	0.03	0.12	1.77	0.50	0.00

SCA	2015	0.21	0.16	0.02	0.14	1.67	0.85	0.02
SCA	2016	2.04	0.50	0.01	0.49	1.99	0.47	-0.28
SCA	2017	2.72	0.55	0.01	0.53	2.23	0.41	0.04
SIU	2013	0.58	0.21	0.07	0.14	1.90	0.18	0.01
SIU	2014	1.00	0.35	0.14	0.21	1.91	0.29	0.03
SIU	2015	1.14	0.35	0.08	0.27	2.04	0.25	0.02
SIU	2016	0.68	0.25	0.01	0.24	2.30	0.31	0.04
SIU	2017	0.70	0.27	0.06	0.21	2.16	0.32	0.05
SRE	2013	1.63	0.49	0.17	0.32	2.34	0.25	0.02
SRE	2014	2.04	0.52	0.19	0.33	2.10	0.26	0.02
SRE	2015	1.36	0.31	0.24	0.07	1.24	0.20	-0.06
SRE	2016	0.96	0.30	0.17	0.13	1.17	0.40	0.00
SRE	2017	1.10	0.38	0.11	0.27	1.28	0.60	0.05
SZI	2013	0.88	0.32	0.16	0.16	1.61	0.35	0.07
SZI	2014	0.90	0.31	0.13	0.18	1.71	0.37	0.06
SZI	2015	0.60	0.23	0.06	0.18	1.81	0.39	0.07
SZI	2016	0.55	0.20	0.05	0.15	1.57	0.41	0.09
SZI	2017	0.51	0.20	0.07	0.13	1.35	0.46	0.07
FEC	2013	0.72	0.34	0.24	0.10	1.24	0.56	0.05
FEC	2014	0.76	0.34	0.19	0.15	1.64	0.54	0.06
FEC	2015	0.74	0.34	0.14	0.20	1.67	0.54	0.06
FEC	2016	1.05	0.41	0.11	0.30	2.12	0.48	0.04
FEC	2017	0.93	0.36	0.10	0.26	2.57	0.44	0.06
SEA	2013	0.27	0.20	0.09	0.11	1.69	0.79	0.04
SEA	2014	0.33	0.23	0.03	0.20	4.07	0.74	0.04
SEA	2015	0.33	0.24	0.08	0.15	2.28	0.74	0.08
SEA	2016	0.35	0.25	0.13	0.12	4.64	0.34	0.05
SEA	2017	1.80	0.58	0.33	0.25	1.11	0.62	0.00
ZGH	2013	1.22	0.39	0.13	0.26	2.50	0.07	-0.08
ZGH	2014	2.30	0.44	0.13	0.31	2.34	0.05	0.05

ZGH	2015	1.96	0.47	0.20	0.27	1.89	0.11	0.07
ZGH	2016	1.62	0.42	0.04	0.38	2.62	0.13	0.01
ZGH	2017	2.15	0.46	0.07	0.40	2.48	0.11	0.02